

MAKING THE MOVIES

MOVIES

JEANNE BENDICK
ROBERT BENDICK



MAKING THE MOVIES

Copyright, 1945, by McGRAW-HILL BOOK COMPANY, INC.

All rights reserved This book, or parts thereof, may not be reproduced in any form without permission of the publisher

*This book is produced in full compliance
with the government's regulations for con-
serving paper and other essential materials.*

First Printing

PUBLISHED BY WHITTLESEY HOUSE

A division of the McGraw-Hill Book Company, Inc.

Printed in the United States of America

*To the Tenth Combat Camera Unit
of the Army Air Force*

THE CREDITS

Star billing to all the technical advisors, editors and assistant directors who helped to make this book—to those both in and out of the business of making the movies.

And special thanks to Andrew Holt, who worked hard enough for two.

ON EVERY war front, motion-picture cameramen have filmed the historic events that are a part of our times. They move forward into battle on land and sea and in the air. Some of these men have died to get the battle pictures you see in your theater. They knew and believed in the importance of motion pictures and they gave their lives to get them.

Never before has it been more important for us to see what is going on in the world around us. Everywhere our future is being made. The movies have done their part in war. They will be important, too, in helping to keep a good peace in our better world.

In the fifty years since the movies began, they have grown from a sideshow curiosity into a great industry, which provides us with unlimited entertainment and information. From its simple beginnings in a hand-cranked camera, movie making has developed into a complicated and many-sided process.

Thousands of people and hundreds of arts, crafts, and sciences are employed in the making of movies. This book is about all kinds of movie makers and how they create a finished picture. We hope it will help you to enjoy the movies more.

CAPTAIN ROBERT BENDICK,
10th Combat Camera Unit, USAAF

THE PROGRAM

A FEATURE

A NEWSREEL

A DOCUMENTARY

A CARTOON

<i>Reel One</i>	<i>THE CAST</i>	11
<i>Reel Two</i>	<i>THE FIRST MOVIE MAKERS</i>	18
<i>Reel Three</i>	<i>A MOVIE BEGINS</i>	32
<i>Reel Four</i>	<i>THE SETS</i>	40
<i>Reel Five</i>	<i>CASTING, COSTUMING, AND MAKE-UP</i>	57
<i>Reel Six</i>	<i>START SHOOTING</i>	66
<i>Reel Seven</i>	<i>THE SOUND</i>	75
<i>Reel Eight</i>	<i>THE ACTORS</i>	90
<i>Reel Nine</i>	<i>THE CAMERAMAN AND THE CAMERAS AND CAMERA TRICKS</i>	102
<i>Reel Ten</i>	<i>EDITING AND PROCESSING</i>	119

<i>Reel Eleven</i>	THE NEWSREEL MAKERS AND THE ARMY AND NAVY CAMERAMEN	129
<i>Reel Twelve</i>	DOCUMENTARY AND EDUCATIONAL FILMS	138
<i>Reel Thirteen</i>	THE ANIMATED CARTOON	147
<i>Reel Fourteen</i>	HOW YOU GET THE MOVIES	157
	GLOSSARY OF MOVIE TERMS	169
	BIBLIOGRAPHY	182
	INDEX	185



Reel One
THE CAST

IT TAKES almost three hundred different trades and crafts to make the movies you see at your theater. Thousands of people work at these big and little jobs. Even though you may never realize they are there, each of these jobs is important to every picture, and each of these people is part of the cast. They are the movie makers.

This is the *producer*. He is like the puppeteer in a marionette show, who pulls the strings to make the puppets do their jobs. The producer sees that all the people and things that go into movie making work smoothly together. An *executive producer* decides what pictures will be made, how they will be done, who is going to work on them, and how much money will be spent on each. He may produce several pictures at once or he may do one at a time. Other producers are assigned to a picture, and from that moment on they are





responsible for the production of that picture.

This is the *director*. Sometimes the producer is the director too. The director has more to say than anyone else about what the finished picture will be like. He thinks the whole thing out carefully, and all the work on the picture is done according to his plan. He works with the writers, the designers, the cameramen, and the actors. The picture is built step by step as he sees it. Every picture is made of a thousand little parts that must be beaten together into a story, like ingredients into a cake. This is the director's job.



These are the *readers*. They read the stories and magazines assigned to them by the *story editor* and make synopses of those stories. If the story editor thinks a synopsis has movie possibilities, he will read the full story. Then, after a conference with the studio heads, the synopsis is passed on to the producer who is considered best suited to the type of story in question. If the producer is interested, he will read the book or complete story. If he wants to produce it, the studio buys the story.



These are the *writers*. Sometimes they write an original story, but usually they take one the studio has bought and adapt it for the movies. First they make a *treatment*, or rough outline of the story as it is going to be handled. Then they make a careful script, scene by scene. Sometimes a dozen writers will write different parts of one movie.

THE CAST

These are the *technical advisers*. They make sure that the people in the script act, talk, and dress the way the people they are playing would. In a war picture, for instance, the technical adviser would probably be a soldier who had actually fought in the battle around which the story was woven. He would check to make sure that the actors wore the right battle dress, used the right equipment, talked the right slang, and lived the way the soldiers in that part of the war really lived.

If the picture is about another country, the technical adviser would be someone who has lived there for a long time.

This is the *research department*. They help the specialists of all the other departments when they do research on the details of the picture. Research is especially important if the story is taken from history. If a certain great event in the picture happened on a rainy day, it is the job of the research department to find that out. If a street or a room looked a certain way, if an important character always wore a spotted necktie, they must find out those things too.

Mistakes in a picture are called *boners*,¹ and audiences are quick to notice boners in any picture. Once, in a movie, a submarine was lying at the bottom of the sea, trying to escape the searching enemy ships overhead. While they were waiting, the crew sang songs. Ships have such good sound detectors that when a



1. Indian pictures are good examples for these flaws.

submarine is really trying to hide, the men are not allowed to talk at all. They even have to walk around in their stocking feet. This was a real boner. The technical adviser and the research department try to make sure there are no boners.



These are the *designers*. In important pictures, the production designer supervises the designing of the whole picture: sets, costumes, lighting, and camera angles. The designers under him design the sets and the costumes. They work with the research department to be certain that the costumes are of the right cut and material and that the details of the set are accurate. Shakespeare used clocks in some of his plays that were set in times before clocks were invented. In the movies, that would be a boner. The designers work with the cameramen and electricians to be sure the camera will be able to pick up the effects they have in mind.



These are the *property men*. They furnish the set out of the great studio prop rooms, in which are stored thousands of different properties: tables, chairs, lamps, stoves, draperies, and kitchen sinks. If new props have to be made for a picture, they are kept for future use. Special prop men called *set dressers* add all the details to the set, from penpoints to chandeliers.

These are the *builders*—the carpenters, painters, and plasterers. They build the sets.

The *riggers* are builders, too. They build the wooden scaffolds on the set, to hold the overhead lights.

These are the *artists*. They add the finishing touches. They paint background scenery, murals on walls, designs on circus chariots, and signs for the grocery store.

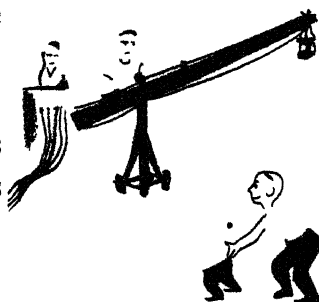
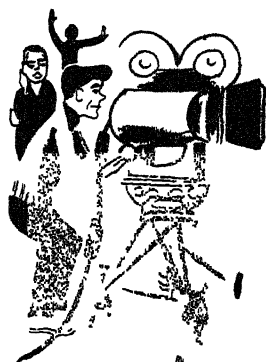
These are the *wardrobe people*. They make some of the costumes and supply others out of the studio wardrobe. They keep all of the costumes clean and in good repair during "shooting."

These are the *cameraman* and his assistants. They photograph the picture. The head cameraman is called the *director of photography*. He has a finger in the set designing and he directs the lighting. Stars keep on the good side of the cameraman because his lighting and camera angles can make them look beautiful or ugly, young or old.

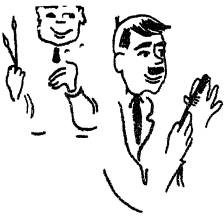
These are the *electricians* and they are called *juicers*. The head electrician is called the *gaffer*. Under the direction of the cameraman and the director, they light the set with dozens of kinds of lights.

These are the *sound men*. They arrange the microphones and record the sound. They mix the sound that is recorded during the picture with the sound that is recorded before or afterward.

These are the *grips*. They are stagehands who move scenery and equipment and act as

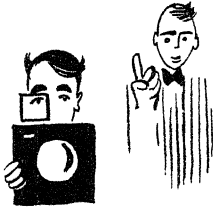


THE CAST

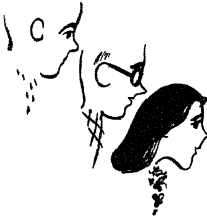


all-round helpers and handy men on the set.

These are the *make-up man* and the *hairdresser*.



These are the *publicity men*. They take still pictures, write stories about the stars and the production, and see that news of the movie gets into the papers and magazines.



These are the director's right-hand men: the *assistant director*, the *production manager* and the *script girl*. They attend to all the little details for which the director has no time. The assistant director makes sure that the actors are in their places and that the right things are on hand for shooting each scene. He checks to see that the equipment is ready. The production manager finds the best places for scenes that must be taken away from the studio lot. The script girl keeps an accurate record of everything that happens on the set. They all do dozens of little jobs that make the shooting go off on schedule as smoothly as possible.



This is the *film editor*. With the help of the director and the producer, he cuts and edits the film. Sometimes the film taken is twenty times longer than the one you finally see. The editor, director, and producer decide what is to be left in and what taken out, and which is the best of several *takes* of a scene. They must cut out hundreds or even thousands of feet of film to make the picture the right length. Sometimes an actor's whole part may be cut completely out of the picture. Then he be-

THE CAST

comes "the face on the cutting room floor."

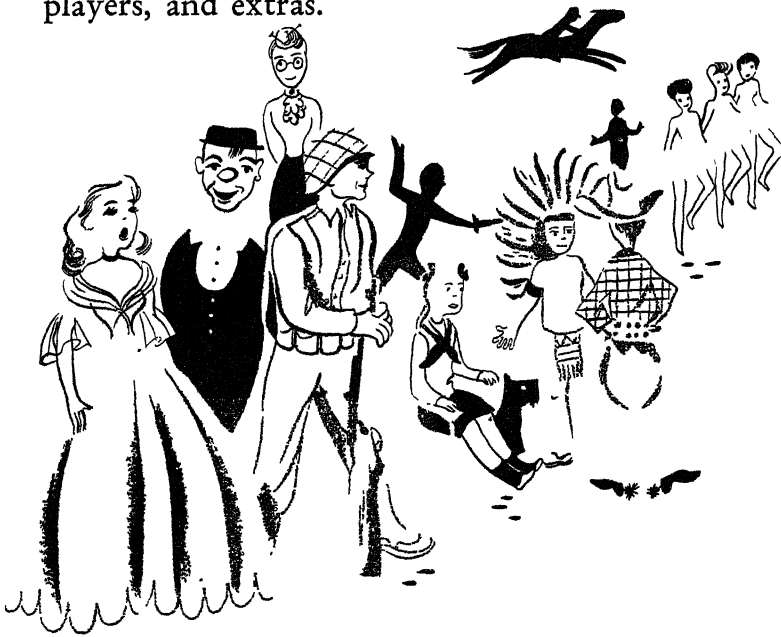
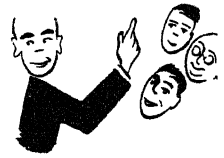
The *sound editor* edits the various sound tracks.

These are the *special-effects men*. They make the movie tricks in the laboratories. They make people disappear or fly through space or turn into other things. They make *dissolves*, *fades*, and *montages*.

These are the *lab men*. They develop and print the picture.

These are the *music director* and his musicians.

And these are the *actors*—stars, featured players, stand-ins, and doubles, stunt men, bit players, and extras.



All these people and more, and all their helpers, make the movies.

Reel Two

**THE FIRST
MOVIE MAKERS**



WHEN the movies were new, a cameraman and a camera were all that was needed to make a picture. The cameraman would set his camera up in the street and take the people walking by. Or he might go to the beach and take a picture of the ocean breaking onto the shore. The pictures weren't very good but they *moved* and that was all that mattered.

Moving pictures still aren't very old. They are younger than a great many of the people who enjoy them.

A bitter argument among some French painters brought about what might be called the first motion picture. A painter named Meissonier had painted a picture of a horse in full gallop with all four feet off the ground. Other painters scornfully told him that the position was ridiculous. The argument got nowhere until Meissonier heard about some pho-

tographs that had been taken in California, for a famous horse breeder.

A photographer named Muybridge had lined up a row of cameras beside a track with a string stretching across the track from each one. As the horse passed each camera he broke the string, which tripped the shutter and took his picture. In this way Muybridge got a series of separate photographs that were all parts of one complete motion.

Meissonier had these pictures brought to Paris. After printing them on transparent material, he ran them off on a crude projector, one after another. The pictures followed each other so quickly that the horse looked as if he were moving, and he plainly took all four feet off the ground. Meissonier's pictures looked like a moving picture of a moving object. Although they were taken with a number of cameras instead of with a single one as we do now, they were really the same as our movies are today.

Motion pictures are a series of still pictures, each one a step in a complete motion. These pictures are flashed past your eyes so quickly (you usually see at least 24 complete pictures every second) that they look like one continuous action. Your eyes do not work fast enough to see the spaces between the pictures. When a space comes along you are still seeing the picture before it, and you keep seeing that picture until a new one takes its place.



This is called *persistence of vision*, and it is the only reason moving pictures move.

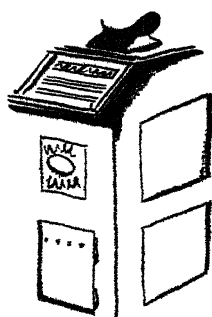
Before very long Wallace Goold Levison, of Brooklyn, improved on Muybridge's way of taking pictures of a motion. He invented a single camera that could take a series of pictures one after the other on separate plates. These pictures were taken for study in many scientific experiments. Nobody thought of looking at pictures of motions just for fun.

Then after several experiments, Thomas Edison invented a picture machine that ran off a long line of little pictures one after another, between a strong light and a lens that enlarged them.

Realizing that the pictures would move more smoothly if they were printed as a single strip, he tried making strips of film, first of varnish and then of tape, but neither worked. Then he heard about the flexible strips of film which a camera manufacturer named George Eastman had made to fit the rollers of his cameras. Edison bought a strip of this film and tried it in his picture machine. It worked. The machine was called the *kinetoscope*. The first showing of kinetoscope pictures was in October, 1889.

The kinetoscope was a peep show. You put a penny in a slot, turned a little handle, peeped into the eyepiece, and watched the movie. You were running the theater yourself. There wasn't time for more than one action, such as

THE KINETOSCOPE

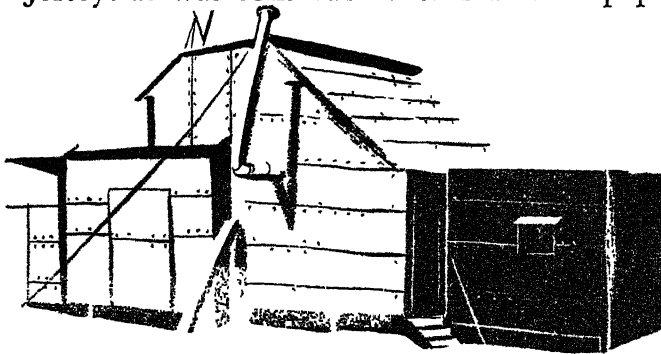


a magician doing a trick or a dancer dancing a step, because these peep-show movies were only about thirteen seconds long.

Besides their shortness, there was another disadvantage to the peep shows—only one person could watch a show at a time. People wanted to sit down and enjoy the movies together, as they could magic-lantern slides.

Although Edison did not approve of the idea at all, several inventors started experimenting with projectors that would make this possible. Edison thought that if large groups of people could look at the movies together, they would get very tired of them and then his kinetoscope would lose its value.

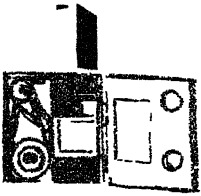
The camera that took pictures for the kinetoscope was called the *kinetograph*. It weighed almost a ton, was completely immovable, and could take pictures only in very bright sunlight. The studio in which these pictures were made was in West Orange, New Jersey. It was constructed of black tar paper



THE BLACK MARIA

and was set on a platform that could be revolved to keep the stage in the sun. Instead of the moving camera we have now, the camera stood still and the whole studio moved. This studio was nicknamed "The Black Maria."

In 1894, Woodville Latham devised a machine something like the kinetoscope, but you didn't have to peep through the eyepiece to see the pictures. The machine projected them on a screen. Latham and his sons photographed a prize fight on the roof of Madison Square Garden. They projected these pictures with their machine May 20, 1895.



LUMIÈRE PROJECTOR

In 1895, too, the first real projectors were invented by the Lumière brothers in France, and by Thomas Armat in this country. These made possible the beginning of the movies as we know them today. On Apr. 23, 1896, Koster and Bial's Music Hall in New York City had the first moving-picture show, attended by a large and fascinated audience.

At first, movies were considered just a novelty and were shown at the end of vaudeville shows, in penny arcades, or at fairs and picnics. The more people saw of these pictures, the more they wanted to see, and soon the movies were here to stay.

Anybody could make a movie. All he had to do was set the camera up in the street and take whatever happened to be going on at that minute. Movie-goers simply wanted to watch

anything that moved on the screen. Nobody thought of making movies that told stories. If the scene were arranged at all, it was called a fake.

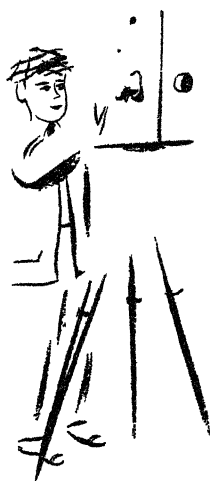
Cameras were awkward and difficult to move. Once the cameraman got his camera to the place where the picture was going to happen, it stayed there. The camera eye never changed its point of view until the picture was finished.

Next time you go to the movies, notice how different they are today. The camera eye is rarely still. The camera itself keeps moving. Almost every scene is made up of several *shots*, each taken from a different angle. Did you ever notice that you almost never see a scene from the same place for more than a few seconds at a time? But in the early movies, the camera did not move any more than a window looking out onto the scene would.

The first step toward making the camera move was a change in the tripod, the stand on which the camera sits. Someone thought of making the top of the tripod movable, so the camera would turn. This movable tripod top is like a neck to the camera head.

You can turn your head from one side straight around to the other, seeing everything that passes your eyes on the way. Now the camera could do this, too. It is called *panning*.

The first cameras and film were very crude and slow. Pictures had to be taken in strong

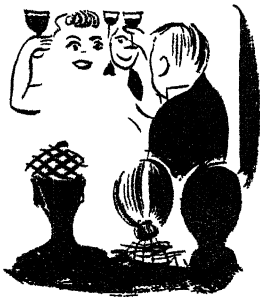


AN EDISON CAMERA
1902

sunlight and they were neither clear nor good. This limited movies to simple things. As cameras and film improved, the movies began recording important events in the world around them. Now people could watch parades and floods, the inauguration of President McKinley, and even some pictures of the wars in Cuba, in Africa, and in China.

For a while, all movies were newsreels.

The early movies had a great influence on the people who saw them. Because the movies were not considered very respectable at first, the audiences were usually uneducated people of the poorer classes. They were sure that "seeing was believing." It never occurred to them to question anything they could see with their own eyes. The movie makers could make them think almost any way they chose. They told them that certain people were always good or bad; that the rich were always rascals and the poor, downtrodden; and that people of one country were all kind and good and those of another unfailingly cruel.



Today the use of movies for propaganda purposes is controlled. Movie makers are not allowed to push their own ideas of what is good or bad upon their audiences. Of course there are ideas in every movie, but the movie makers obey certain rules about what they can say to us through their pictures.

At last the movies began to tell stories. The first story movies were hardly more than a

minute long. The first man who saw the possibilities of movie make-believe was a French magician named George Melies.

Melies used to wander around Paris with his camera, taking pictures just for fun. One day while he was taking a street scene with a large bus in it, the camera got stuck. It took a minute or two to fix, and then he went on shooting the scene. When the film was developed, Melies was astonished to see the bus turn into a hearse right before his eyes.

On examining the film he realized that the hearse had moved into the bus's place while he was fixing the camera and that in fixing it he had wound back some of the film already exposed. Some of the single pictures, or *frames*, had been exposed twice and had pictures of the bus and of the hearse on them, one on top of the other.

Melies was very much excited at the idea of being able to play such tricks with the camera. He experimented until he discovered a great number of them. They are the basis for most of the trick photography we use today.

Melies was the first to work out a movie story built out of a number of carefully arranged scenes. He made a plan, or scenario, of the way he wanted his story to unfold, and then he shot his picture according to the plan. This was in 1900. The name of the picture was *Cinderella*. It was much longer than any



GEORGE MELIES

other picture of the time, running a full four minutes.

Cinderella had actors, costumes, and sets. When it was shown in America, people went to see it over and over again. Nothing the American movie companies made during the next few years compared with the movies George Melies turned out.

MELIES' "CINDERELLA"

Then an American cameraman, Edwin S. Porter, came on the scene. While working for the Edison Company, Porter had an idea. Why did a picture have to be taken scene by scene in the exact order in which they were to appear? Why couldn't you cut the film scenes apart and then paste them back together again in whatever order they would be the most exciting? As simple as this seems now, nobody before Porter had ever thought of it. If a picture had several scenes, they were taken in order and that was that; even if it meant returning to the same set again and again after the intervening scenes had been taken.



EDWIN S. PORTER

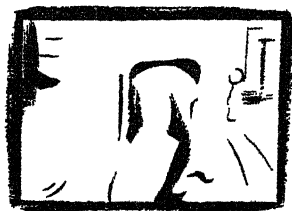
Porter made a picture called *The Life of an American Fireman*, mostly out of some old shots the company had of fire engines and equipment. This was the first picture in which cutting and editing were used. Porter found ways of hitching the scenes together so that they would unfold smoothly, one into the next. Before this, the main scenes had followed one another without any explanatory scenes to connect them.

Now, instead of having his first scene in the firehouse and the next of the firemen on their way to a fire, Porter put a scene between them—a hand turning in the alarm. The audience didn't have to guess why the firemen had rushed out.

There was something else important about that in-between scene. It was the first close-up shot ever used in the movies. Up to that time, the camera was always placed some distance away from the actors so that it could take the whole scene. It had never occurred to the cameraman that the action might be clearer if just a part of the scene was shown, close up.

In 1903, Porter made *The Great Train Robbery*, which is one of the most famous of all the early movies. It had a complete story, while *The Life of an American Fireman* was hardly more than one incident, and it made use of all the cutting and editing tricks Porter had learned. It was the first American movie that was at all like our movies today.

During these years the business of making movies was growing steadily. Most of the moving-picture companies had moved from New York to California. There they had more room, lower taxes, better weather with more days of sunlight, and a kind of landscape that might have been built to order. Within an area of a few hundred miles the movie makers are able to find landscapes resembling those



THE FIRST
CLOSE-UP

of almost every country in the world.

Studios were built and more and more people worked at making movies, but for several years no one bothered with new ideas. The directors and cameramen and helpers were all satisfied to copy what Porter had done in his movies. As a result of this, the pictures made abroad were far better than American movies.

David Wark Griffith was the first of the great directors. He did more to make movies as they are today than any other man in movie history. He influenced not only American movies but those of other countries as well. He was not afraid of trying new things even when the people he worked with and the people he worked for objected.



DAVID W. GRIFFITH



GRIFFITH'S CAMERAMAN,
BILLY BITZER

Griffith was the first director to realize that you didn't have to finish a scene completely before you showed the next one. Wouldn't it be more exciting to leave a scene in the middle, go on to something else, and then come back to it?

For instance, in Griffith's most famous picture, *The Birth of a Nation*, the heroine had been captured by the villain, and a troop of horsemen were riding to her rescue. First you see the heroine about to marry the villain. Then the scene cuts to show the horsemen galloping to her aid. While you watch them cutting across fields and fording streams you are thinking anxiously, "Will they get there in time? Will she really have to marry him?"

You worry much more than you would if the heroine were in front of you all the time and you could *see* what was happening.

Griffith was the first movie maker to use this type of cutting. It is called *cross cutting*, or *double cutting*.

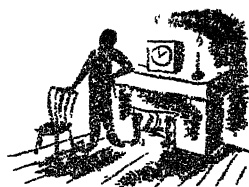
He was the first to move the camera in the middle of a scene. To him, just the movement of the actors was not enough. He realized that the secret of an exciting motion picture was the motion itself, not only of the actors but also of the camera.

He was the first to use a close-up of a face.

He was the first to hire professional actors for his pictures. He insisted that the acting be natural. His close-up was a great help because if the actors were good they did not have to faint to show that they were afraid or to jump up and down to indicate happiness.

Griffith was the first to realize what a large part good lighting played in a picture. He noticed that long shadows could make the audience feel one way and bright lights on the same scene make them have entirely different emotions. Before this, cameramen and directors had lighted every scene as much as possible and no shadows were allowed.

He was the first to realize that it took many shots, not just one, to build up a good scene. Up to this time, directors had allowed only the direct action itself to be in the scene. Next time you go to the movies, here's something



A VARIETY OF SHOTS
BUILD UP A MOOD



else to look for. See how many different shots are used to make up a whole scene and to build up the feeling the director wants you to have.

If he wanted to make you feel that a house was old and sinister, he wouldn't just show you a shot of the house. He might show you spider webs and a broken window, a weed-grown garden, shrouded furniture, bolted doors, and perhaps a pair of eyes peeping out from behind a shutter. All these shots built into a scene would be much more effective than a single one of the house itself.

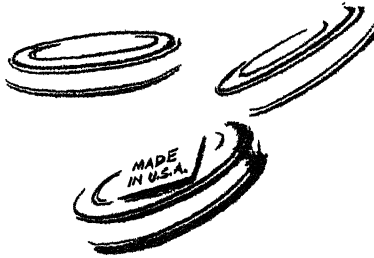
Griffith produced the first American four-reel picture, which was almost forty minutes long. The very idea of making such a long movie frightened the executives of the movie company he worked for almost out of their wits. They thought that no audience would watch a movie that long and that everyone would get up and walk out in the middle. Our movies today are usually more than twice that long and, occasionally, as much as four times that long.

You might even say that Griffith kept the United States in the motion-picture business. Up to the time he started making his truly great pictures, nothing had been done here to compare with the movies that had been made abroad. European pictures were on a much grander scale than ours, with all sorts of elaborate sets and equipment and great numbers of people working at them. These pictures were,

THE FIRST MOVIE MAKERS

in every sense of the word, really colossal.

In 1914 everything changed. England, France, Italy, and Germany had to stop making movies to fight a war. In the four years before we entered that war, we took over the world's business of making movies. We never lost this advantage. Although today all the other countries are producing more and more movies, most of the world's movies come from America.



Reel Three

A MOVIE BEGINS



WHEN a story editor finds a story he likes, he takes it up with the studio heads and with interested producers. If they all agree that the story should be bought, the legal department draws up a contract and the studio buys the story, usually through its treasurer. Often, though, stories are bought at the request of interested directors or stars.

Now the responsibility for the picture passes on to the producer. A producer is a very busy man. If he is an executive producer, he is often producing several pictures at once, and they will probably all be in different stages of completion. One is ready for the theaters, one has run into trouble and is being reshot, and the new one hasn't even begun. The executive producer has to divide his time among them. He usually starts by assigning an assistant producer to work on each picture.

When the studio bought the picture, it probably had certain stars in mind for the leading parts, and it starts arranging for those stars to take the parts.

Now the story goes to the writers, and while they are working on a treatment, the director is chosen. This director is an important man. He is going to have more to do than anyone else with the way the picture turns out.

Every director leaves his own mark on a picture—a mark that is just as personal as a fingerprint. A director tells a story in film with scenes and people, lights and cameras, just as an artist does with a paintbrush or a writer does with words. A good director has worked out his own way of telling a story and the technique he uses to make you feel things is as much his own as is one artist's particular way of painting trees or another's way of drawing people.

More and more, directors are beginning to work with the picture from the start. Since a director knows how he wants it to look when it is finished, things go more smoothly if he is allowed to have a crack at the script while it is being written.

Plays or books cannot be used just as they are for the movies. Sometimes characters must be changed to suit the censors or the stars. The words that describe a scene or a thought in a book must be changed into pictures for a



movie. If a movie is being made from a play, the writers must put more action and more scenes into it than are possible on the stage of a theater. A great deal of movement is still the most important law of the movies.

The first rough treatment is usually written around the stars who have been chosen for the picture. Then the hard work begins. The treatment is broken up into sequences, then into scenes, and finally into shots. Other writers are called in to write dialogue: one may write the funny parts and another the sad parts. The producer may not like the way the script is coming along and get half a dozen new writers to help before it is finished. During their work, the writers often call on the research department to check details for them.

The writers have many things to keep in mind. There is no time to waste in a movie. In a little more than an hour you must get to know the people in the picture and become interested in what is going to happen to them. The story must unfold and finally end in a way that will satisfy the audience.

Besides this, the writers must keep in mind what the director wants, the abilities of the stars who have been chosen, censorship rules, and the budget for the picture. By remembering these things while they are writing the picture, they save time and trouble after the shooting starts.

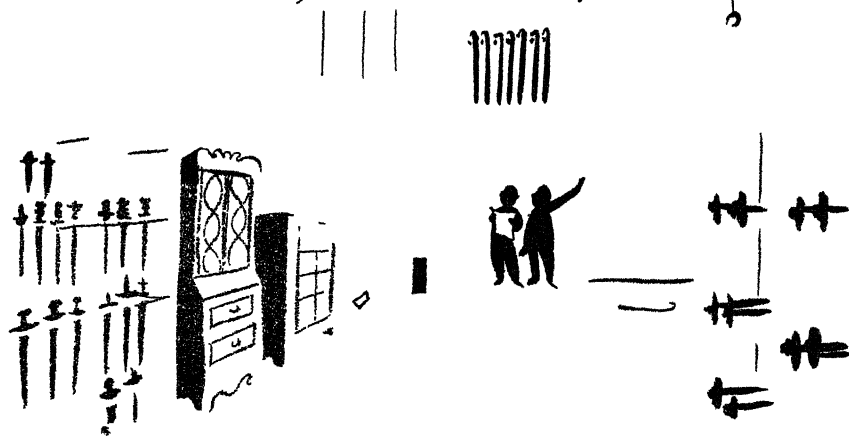
The script they finally turn out is called

the *shooting script* or *continuity*. It is a careful listing of scenes in order. There is really no final script for a movie. Changes are constantly being made during shooting and then again in the cutting room.

Mimeographed copies of the script are sent to all the people who have been chosen to work on the picture. Each department is told how much money it can spend out of the budget for the entire picture.

A copy of the script goes to the sound department and a separate sound script is made, with all the sound effects in careful detail.

A copy of the script goes to the prop man. He goes over it carefully and marks the props he will need. He looks in his files to see which ones the studio has in its prop room. The others he will have to get, somewhere. It is like a giant treasure hunt for all sorts of queer things. Some props he can rent from property houses that make a business of collecting all sorts of unusual objects the studios may need.



They have thousands of kinds of clocks, daggers, and paintings of famous people. They may be called on to supply a copy of a rare fan three hundred years old or a Spanish lantern from the time of Columbus.

There may be animals called for in the script, and it is the job of the prop man to get these, too. Some animals he can rent from the zoo; others he can rent from people who keep and train a wide variety of animals just for the movies. When he needs them, the prop man knows where to find a thousand grasshoppers, a waltzing bear, or a raven that talks.

A copy of the script goes to the *locations department* because part of the picture must be shot *on location*—away from the studio. The *location manager* or one of his assistants goes out to look for the location that fits the script best—a certain stretch of desert, a cove of exactly the right shape, or perhaps mountains with snow on them. When the location has been found and agreed upon and if the main company is going there for shooting, it is put in charge of the production manager. If just a small group is going while the main company works elsewhere, it is put in charge of a *unit manager*.

A copy of the script goes to the music director. The musicians study it, decide on suitable music, and then arrange or rewrite it. Sometimes new music is written especially for the picture.



Other copies of the script are sent to the cameraman, to the designers, to the actors, to the electricians, to the wardrobe people, and to everybody else who is going to work on the picture. Now the wheels of all the departments are turning.

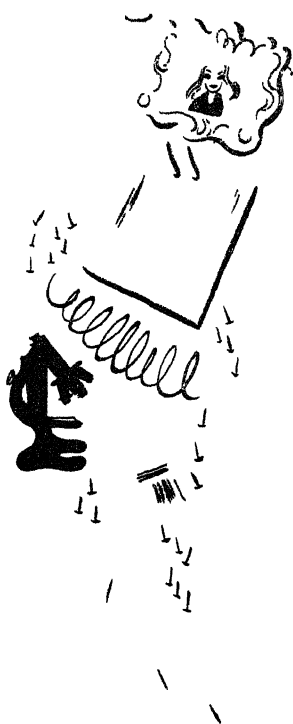
If the picture is to be a "quickie," all this planning and preparation will be jammed into two or three weeks, the total production cost will be somewhere between ten and fifty thousand dollars, and the shooting will not take more than a week or ten days. While one scene is being shot, the writers may still be working on the scene that is to be taken next. Usually quickies are made by small companies who rent space in the big studios.

If the picture is to be a big one, the preparation and planning may go on for a year or more before the actual shooting starts. Getting the picture down on film is just the last step in a big job.

A big movie studio is like a whole city hard at work. It even looks like a city. It has bungalows for the actors and officials to live in, office buildings, restaurants, theaters, and warehouses. It has a foundry, a power plant, a mill, a school, and a hospital. It has roads, policemen, and a fire department.

Two hundred and seventy-six trades and crafts work at movie making. An important movie will use all of them and their hundreds of workers. It will require barrels of paint,





tons of metal and lumber, bolts of cloth, and gallons of cold cream. It will need painters, electricians, woodcarvers, scientists, artists, watchmen, and truckdrivers. It will take days, months, and sometimes even years of planning.

As the time for shooting the movie draws near, the work of all departments on the script is broken down into a *shooting schedule*. The shooting schedule is a kind of blueprint for the whole movie, complete with camera directions, lighting suggestions, music, and sound.

Scenes in the shooting schedule are grouped in the order in which they will be taken. For instance, all scenes in the same costumes on one set will be taken following one another even if they are separated in the finished movie. This is much handier than having to switch all the equipment back and forth from set to set.

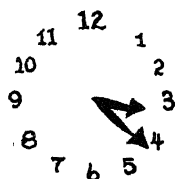
The shooting schedule is placed on clipboards by the production department and used as a calendar for each day's work. It tells exactly what scenes are to be shot and where they will be taken. The whole company—which means all the people who are working on the movie—studies the shooting schedule. Then each department makes a list of what is needed for each day's work so that everything will be on hand when it is needed.

It is important to plan as much as possible beforehand because once the shooting has

A MOVIE BEGINS

started, the average movie costs about three thousand dollars an hour. It would be very expensive to keep stopping for things someone had forgotten. All the lists, conferences, and planning are good insurance.

In spite of all this care, though, there are always delays, and pictures generally cost more than they are supposed to. The beforehand plans consider these mishaps and make special allowances for them in the budget.



Reel Four
THE SETS



THE roads leading away from the main buildings on a movie lot wind through whole towns full of permanent sets tucked in different places on the lot. These are the sets that can be used over and over again for new pictures, with only small changes or none at all.

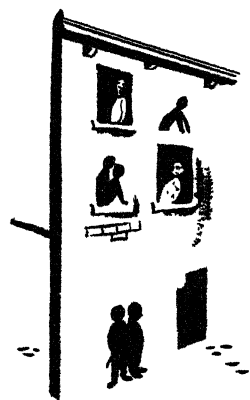
There will almost always be a street in a small American town, for instance; a familiar-looking street with great shady trees and white houses with picket fences. The houses are really nothing but fronts braced up by scaffolding; but then, the camera never actually takes you through the front door so it doesn't matter.

If you turn the corner of that pleasant street, you will find yourself in the middle of a Western boom town, with gaudy saloons, hitching posts, and perhaps a claim office. This is probably the most used set on the lot

because there are more westerns made than any other kind of movie.

Another turn and you're in China; another and you're in a famous railway station. Other sets are stored in huge covered shelves and can be taken to the big studio sound stages and set up there. There is a special department in charge of this, called the *stock unit department*. The studio saves time and money by having these sets waiting because they can be used over and over again. Signs may be changed. A store that was a grocery in one picture may turn up as a drugstore in the next. These small differences keep the audience from recognizing the sets. After all, the main street of one small town looks pretty much like that of any other if it's not your own town.

Besides these big sets there are smaller ones that show parts of places: half of a ship, corners of famous buildings, and all sorts of railroad cars. These sets come apart like picture puzzles. Sections of walls come away and sides of railroad cars are taken out so that the cameras can look into them and so that they can be easily lighted. Nowhere is there a roof to be seen. There may be a front of a roof, but the tops of most sets are left completely open for the big wooden scaffolds, called the rigging, from which the lights are hung. Other, larger lights stand on the narrow catwalks of the rigging.



Somewhere on the lot there will probably be a big tank for filming sea scenes. In the tank are contraptions called agitators for making waves. Sometimes large pieces of canvas under the water are raised and lowered to push the water up into waves. Sometimes there are rollers to churn up the "sea." Sometimes an air-filled tank is bounced up and down in the water like a piston.

There is usually a wind machine, too. The wind machine is a big airplane engine with a propeller on the front of it just the way it would be on a plane. When the engine is started, the propeller turns and makes a wind.

There is even a machine for making lightning.

Whole towns could be built with the materials the studios use every year in their sets—forests of lumber, carloads of nails, hinges, and doorknobs; mountains of plaster, miles of steel, and enough furniture to furnish every house in town.

When the movies were first made, there were no sets. Pictures were taken on busy streets, in the country, or at the beach—always out of doors. In many of the old films you can see the crowds of interested onlookers right in the picture. This kind of picture taking is called filming "on location" now.

Shooting a scene on location seems a lot easier than going to all the trouble and expense of building huge sets of outdoor things



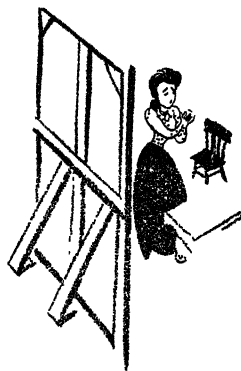
and shooting them at the studio, but this is not so wasteful as it sounds.

Outdoors you have to depend on the weather, which isn't always right, even in California. The sun may be shining brightly when the script calls for rain; it may be so late or early that shadows are in the wrong places; or it may be the middle of the day with no interesting shadows at all.

Shooting sound pictures on location adds another problem that the early movie makers didn't have to think about. The noise of an airplane flying overhead, of a dog barking a half mile away, or even a bumblebee flying too near the sharp-eared microphone can ruin the whole take.

Very early in the business of making movies, it became clear that much time and worry could be saved by taking the pictures inside, and so the movie makers built huge studios with glass walls and ceilings to let in the light. Then they started building sets indoors. The early sets were all "flats," flat wooden frames with muslin stretched over them and scenes painted on the muslin. Nothing looked very real. If a door slammed or an actor leaned against the wall, the whole set was likely to fall over or at least wobble back and forth a little.

Now sets are built to look as real as possible. Set designers and builders are always searching for materials that look real and that will





bear weight where it is needed without being as heavy or as expensive as the real thing. It wouldn't be practical, for instance, to build a castle out of real stones for a movie set. It would take too long to build, it would be too expensive, and most important of all, it would be impossible to take out a stone here and there to make room for the lights or the camera without the whole castle caving in. So a castle is usually built of wood with stones made out of papier-mâché, glued on lengths of canvas and fastened to the wooden frame.

Although it is slowly giving way to a plastic material, papier-mâché is still an important material in set making. It is made of layers of wet paper and glue and can be molded into any shape. (Faces of most puppets are papier-mâché.) It is very light and cheap. Papier-mâché stones look like real stones, and after these are painted, you would have to touch them to tell the difference. If you wanted the stones to look wet in spots as the stones of a real castle would, a trickle of varnish would do the trick. It shines like water, but it doesn't dry up and disappear under the hot lights.

Every studio has a *supervising art director*, who is the head set designer. He supervises designs for all new sets. He has a great many assistants because the job is a big one. His assistants are called *unit art directors*. One works on the sets for each picture in production. These unit art directors, in turn, super-

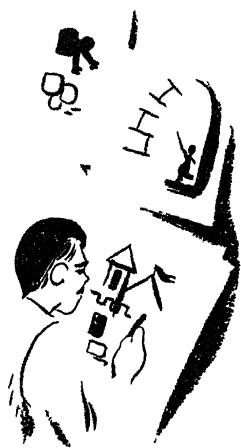
vise the work of a number of artists, model makers, architects, draftsmen, carpenters, and plasterers.

As soon as he gets a copy of the script, the art director carefully notes the sets that will be needed and what action is to happen on each one. Then he makes rough sketches of each set, taking special notice of the action. If a troop of guardsmen with drawn swords are going to rush through the door, it will have to be extra wide; if the comedian is to get stuck trying to get through the window, it must be quite small. There must be plenty of room for the lights and all the other equipment that is a part of picture making.

The art director works with the head cameraman right from the beginning, because, no matter how beautiful the set is, it is no good at all if it cannot be properly lighted and photographed.

Nowadays the supervising art director has become the *production designer* of the more elaborate pictures. He sketches the entire production, scene by scene, indicating sets, costumes, lighting, and camera angles. These sketches are made into a book, and most of the early work on the picture takes place around this book.

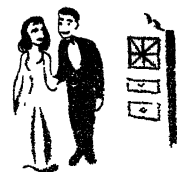
Specialists from each department do their own research for their part in the production, using the studio research department as a library.



If the picture is an important one and if the story is from history, the research may take months. To make sure everything is right, the specialists will search through hundreds of old books for descriptions of rooms and houses of the times. They will look at old paintings and prints and at lists of household goods kept by the people of the day. By the time this work is finished, the set designer will know how the patterns on the carpets looked, what material was used for drapes, the fashionable tree to have growing in the garden, and even what designs were painted on the cups and saucers.

Now final drawings, called *renderings*, are made by the *sketch artist* and include all these details. These renderings are usually done in color even for black and white pictures. During this time the set and costume designers have been working together. The set is to be the *background* for the actors, and the set designer has to keep this in mind. If they are to wear dark clothes, the sets will have to be light. There must be a contrast so that the actors do not fade into the set. A white rabbit is hard to see against the snow, but if he runs across a patch of dark earth, he stands out sharply. It is part of the job of the set and costume designers to make certain that the set and costumes do not blend together and confuse the picture.

Sometimes after the final drawings and blueprints have been okayed, they are turned



over to the model makers, who build miniature sets exactly like the big ones are to be. Tiny furniture is made, drapes hung, carpets laid, and even pictures put on the walls.

The head cameraman and the electricians get together and study the model. The electrician plans the lighting as carefully as if it were a large set, and the cameraman plans his camera angles. If there is anything wrong with the set, they can see it now. Perhaps part of a window is always sticking into the picture and ought to be moved. Perhaps some columns or the chandelier get in the way of the lights. They will have to be changed. Getting the "bugs" out of the set is easy on the small model. If the big set is built before the mistakes are discovered, it means days of rebuilding and wasted material.

Next, blueprints of the set are made for each department, for the construction men, for the painters and plasterers, for the electricians, for the prop men, and for the sound men. While the director is using the model sets to plan his action, the woodworkers and the carpenters are busy building the actual ones.

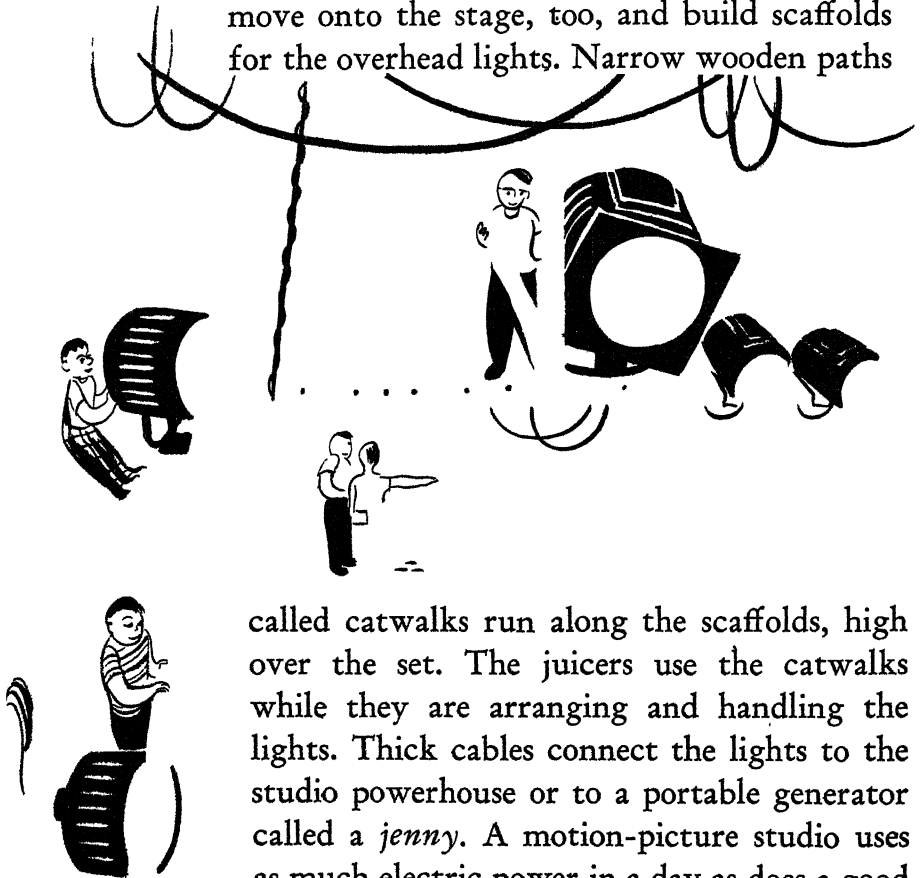
After the real sets are built, the paint department, under the supervision of the art department, goes to work and paints them. Artists do other kinds of painting. They paint all kinds of landscape backgrounds, signs and notices, designs on props, portraits for over the



fireplace, and all sorts of other odds and ends.

When it is finished, the whole set is taken apart. If the picture isn't going to be shot for a while, the set is stored out of the way. If the shooting date is near and the sound stages are not being used for another picture, the set is put on trucks and taken to the stage. Here it is rebuilt, and the finishing touches are added to the painting.

While the set is being assembled, riggers move onto the stage, too, and build scaffolds for the overhead lights. Narrow wooden paths



called catwalks run along the scaffolds, high over the set. The juicers use the catwalks while they are arranging and handling the lights. Thick cables connect the lights to the studio powerhouse or to a portable generator called a *jenny*. A motion-picture studio uses as much electric power in a day as does a good sized town.

The prop department moves in at this point and set dressers "dress" the set. They lay carpets, hang draperies and pictures, and put books in the bookcases and goldfish in the goldfish bowl. The prop department is under the supervision of the art department, too. The prop man has to make sure that everything is on hand that will be needed in the scene. If the heroine has to write a letter, there must be pen and paper in the desk. If the villain is going to be shot, there must be a pistol with which to shoot him.

After the picture has started, the prop man has another job. He is on hand with his prop box. In that box is everything that might be needed in an emergency: needles and thread, nails and glue, buttons and shoelaces, matches, furniture polish, cups, first-aid equipment, and many other items.

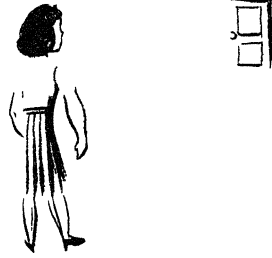
Now the set is ready and waiting. It is complete in everything but a fourth wall; and all the skill of the designer, the cameraman, and the director will be used to make you forget that it isn't there.

The room looks like any other room; but if you examine it closely, you will notice some differences. The moldings on the walls and the frames around the doors and windows are deeper than they would be in an ordinary house. The great amount of light used on a movie set makes things look flatter than they really are because it chases away the shadows.



So if you're going to see the moldings at all, they must be deep.

Often sets are built in perspective to make the scene look much larger than it is. If you're standing at one end of a long hall, the far end seems to be much smaller than the part where you're standing, like this.



In building a movie set, the far ends of rooms and halls and tunnels are actually made smaller so that your eyes fool you into believing the rooms are larger than they really are.

Sets that are supposed to be outside are built the same way, only here perspective is much more important. Things that are a block away or a half mile away look *much* smaller than they are. Well, sets are specially built to look that way. A set may be just fifty feet across, but it can be made to look like a farm in a valley with the hills miles away. The artists paint the background in such a way as to help create the illusion, and things in the background are built on a small scale. If the actors stood next to any of this background, the houses and trees might reach only to their knees.



Your eyes are always playing tricks on you, and the people who build the real things that are around you every day have to make allowances for these tricks. Each of your eyes sees things from a slightly different viewpoint, and your brain combines these two points of view into a single image that is not what you are really seeing at all. For instance, if a column were built straight up and down, it would appear unpleasantly top-heavy to you. Architects make columns and buildings narrower at the top than at the bottom so they will appear to be straight. These corrections do not have to be made in building sets because the camera has only one eye.



Sometimes just a little part of the set is built. Then the actors and that part of the set are photographed against another moving picture. This is called a *process screen*. It works like this.

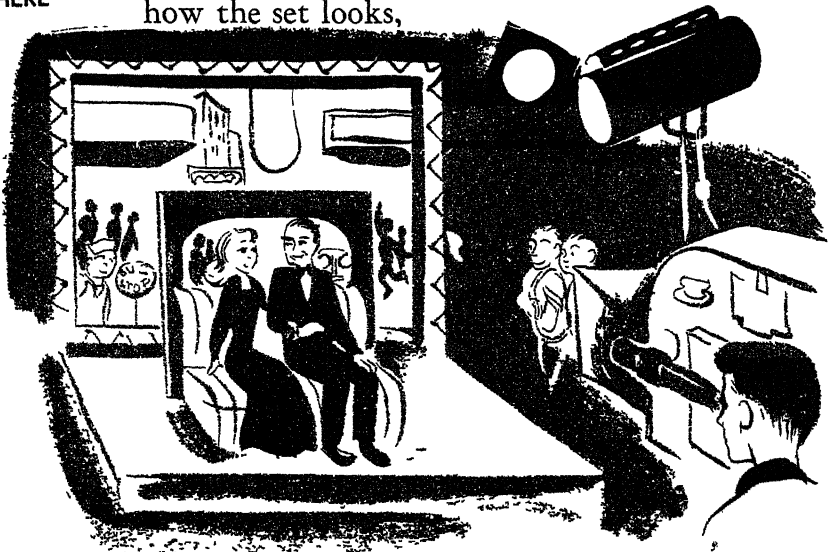
Suppose the script called for the hero and his girl to be riding down Broadway, in New York, in a taxicab. It isn't practical to build a huge set with theaters and stores and to hire hundreds of extras for that one scene. It isn't practical, either, to move the whole company to New York just to shoot it. So the director looks through the studio's film library of places all over the world, and perhaps he finds a movie of a ride down Broadway, complete with crowds and theaters. If there is no film like that in the library, he wires the New York

office of the studio to have one of their cameramen take a camera truck and ride down Broadway, shooting the picture.

When the director is ready to shoot the scene, the hero and his girl sit in the back seat of a taxicab that has been built on the set. The back seat is all there is to the cab. If it were a whole cab, you couldn't possibly jam the lights, the camera, the cameraman, the director, the sound man, and the microphone into the front seat to take the picture.

Behind the dummy taxi stands a huge motion-picture screen that is semitransparent, like a sheet of frosted glass. Behind the screen is a motion-picture projector, projecting the movie of the ride down Broadway. The movie shows through perfectly well to the front of the screen, and the camera sees the pictures through the back window of the cab. This is how the set looks,

THE PROJECTOR
IS BACK HERE

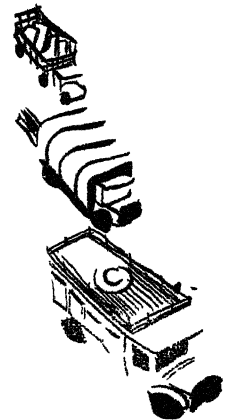


and this is what you see in the movie.



In their libraries the studios have not only movies but also thousands of still photograph plates that show famous places around the world. These can be used as backgrounds where no movement is needed. They are projected on the screen like lantern slides, also from the rear. The use of these lantern slides on the process screen is beginning to give way to huge photographic blowups called *Shipman Backing*. These actual photographs are easier to light and are cheaper, too, because they require no special technicians on the set.

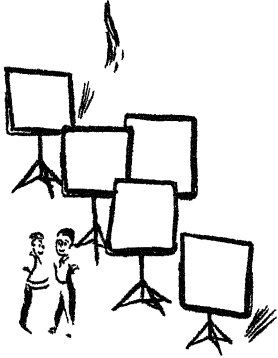
Now suppose there are parts of the script that really must be made out of doors because the action calls for big sweeps of desert or country that can't be faked. The whole company packs up and goes on location. They go in a caravan of trucks. There are trucks with the cameras, trucks with the lights, the props, the sound equipment, trucks full of food for everybody, and busses for all the company to



THE SETS

ride in. Trucks that are whole power plants in themselves must be taken, too, because the cameras, the sound equipment, and the lights all work by electricity and there are no places on hills or deserts to plug them in.

The hardest part of work on location is good lighting. Bright sunlight is strong and harsh and it shines on everything equally. So the movie makers have had to find ways to control the light on outdoor sets as well as indoors. One way they can do this is with reflectors—huge flats of wood and canvas painted silver or covered with tinfoil. The sun bounces off these reflectors back onto the set, so they are used to make certain places brighter or to make shadows stronger.



When the sun is too bright and harsh, huge filters, called *scrim*s, are hung overhead, covering the whole set. These filters are awnings made of muslin or layers of net. While they let most of the light onto the set, they take away the glare. Sometimes filters are as big as a circus tent.



If the pictures are being taken in the shade or if the light isn't very good, "booster" lights are used to help the sun. Often they are used anyway to throw just a little extra light where it is needed on a small spot such as a player's face.

When the movie companies are working on location, they can usually count on all sorts of help in making the picture go smoothly. They

THE SETS

get permission to use private land and places for the company to stay if the weather is too poor to live in tents. Sometimes airplanes are even rerouted to keep them from flying over the set and spoiling the sound.

Often sets that are too big to go indoors are built out on location. These have to be made of stronger materials than the indoor sets or they might be spoiled by wind and storms.

The studios keep many permanent locations, usually on land near the Hollywood area, which they call the studio "ranch." Here are permanent desert sets, Western towns, medieval castles, and other sets that would take up too much room on the lot itself. Some location sets are owned jointly and used by several studios.

Once one of the big motion-picture companies built a huge fort for a picture. The climax of the picture was a scene in which the fort was blown up. The director decided that since the set couldn't be taken apart in sections and used again anyway, they would really blow it up. Usually an explosion scene is made with a model.

All the other scenes around the fort were made. Then the day for the great scene came. The fort was carefully wired with explosives by the powder men. The man who was to throw the switch that would set off the spectacular blast went up to a near-by hill with his priming box. The director told him to wait



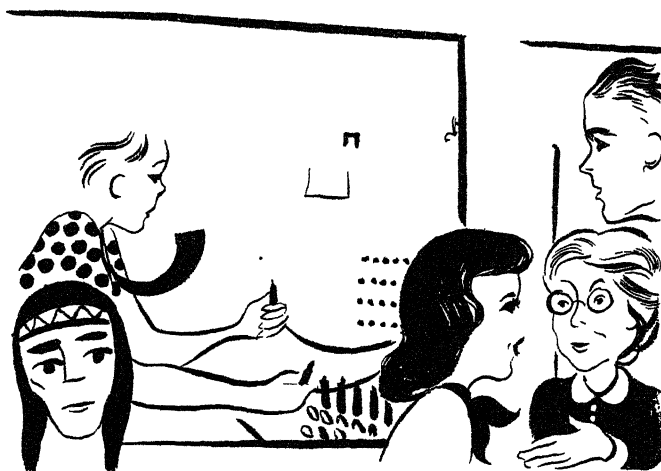
for a certain signal and then to "let 'er rip."

The director rushed around getting a number of cameras set up in different places so they could get the scene from every angle. But while everybody was getting ready, someone gave the signal by mistake. The man on the hill pulled the switch. The fort caught on fire and blew up. Not a single camera got the picture.



Sets are not usually finished off with such a bang. After all the scenes to be shot on the set have been finished and okayed, the sets are taken down to make room for new ones. If they can be used again with slight changes, they are stored, or "folded." Otherwise they are "struck," or taken apart completely, so that the materials in them can be used again. Doors and windows are almost always kept for other sets.

Before the sets are taken down, the producer, the director, the cameraman, the editor, and the stars go over all the film that has been taken on the set to be sure that the scenes are all there and that everybody is satisfied with them. Once in a while a whole set has to be rebuilt just to reshoot a scene that might last two or three minutes.



Reel Five

CASTING,
COSTUMING,
AND MAKE-UP

C ASTING starts the very minute the movie does. Usually the story is bought with certain stars in mind for the leading parts. Then, during writing, the whole story is written around those stars and the kind of acting they do best. If they sing, special songs are written into the script for them. If they are good at dancing or jumping off buildings onto a horse's back, those things are written into the part, too.

The script is written to fit the stars, but the rest of the cast is picked to fit the script. There is a special studio casting department that chooses feature and bit players, but the director has to okay all these choices.

Featured players have big parts in the picture, sometimes as large as those of the stars. Many featured players get to be stars if the movie public likes them.

Bit players have tiny parts. They may be

doormen, conductors, or salespeople who have just a couple of lines to say that aren't very important to the picture. Most casting directors are very careful about picking just the right bit players for even the smallest parts because these players do a great deal toward making the picture real. A bit player's part is in the picture for a reason. In the few moments he is on the screen he must make you laugh or feel sad or perhaps make you think, "Why, he's just like *our* mailman!" Every person in the picture has a job to do in filling out a special part of the story.

The studio casting department has descriptions and screen tests of hundreds of feature and bit players. Sometimes, when a player is being considered for a part, the director and producer will go over his screen tests to see if he is suitable. Sometimes they even make new tests.

Extras are not chosen by the studio casting department. So many extras are used in the movies that just keeping track of them is a full-time business. This job is done by an organization called the Central Casting Agency. All the studios get their extras from Central Casting.

Extras are the actors and actresses who form the background for the stars, the feature players, and the bit players. They are the people passing on the streets, eating dinner at the next table, or cheering the ball

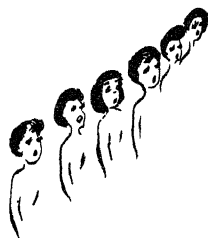


game. Central Casting has the names and complete descriptions of over ten thousand extras on file. There is a card for each extra, telling his height, weight, age, the color of his eyes and hair, and anything special or unusual about the way he looks or the things he can do.

These things are not written. They are shown by punch marks on the card. If a studio wanted twenty red-haired girls, five feet eight inches tall, who sing soprano, it would be a tedious job to search through ten thousand cards to find the right ones. Instead, the cards are put through sorting machines that are adjusted to the particular kind of punch marks those girls have on their cards, and the machine separates their cards from the rest.

Every day, extras get in touch with the casting office to find out whether they are needed by any of the studios for the next day's shooting. If they are needed, they are told when and where to go and what to wear. Unless they have very special talents that are in demand, most Hollywood extras have other jobs, too. They may be sales clerks or waitresses or garage mechanics.

Besides the ordinary extras, there are others called "dress extras." Dress extras get better pay because they have large wardrobes and can report for work in beautiful evening clothes, sports outfits, or whatever the script calls for. This, of course, saves the studio

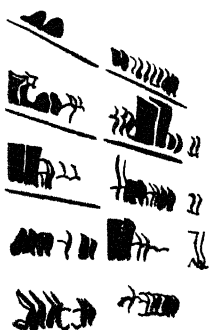


wardrobe a lot of trouble. Dress extras usually work more regularly than the others. The difference in their pay is almost always used up in maintaining the clothes that are their bread and butter.

Large companies outside the studios usually make the costumes, except for those of the stars. If new costumes must be made for a picture, much study and research go into them. These costumes are not sold to the studios but are rented, complete with shoes, hats, and even swords. Then after the picture is finished they are returned to the costume house, where they are stored until they are needed again. They may be changed slightly for the new picture and refitted to the actors who are going to wear them this time.

Because they are kept from picture to picture, the costumes must be well made, of good materials, and carefully stored. Hiring costumes over and over instead of making new ones each time saves tremendous amounts of money, material, and work every year.

While the picture is in production, it is the job of the studio wardrobe department to take care of the costumes and to keep them clean and in good repair. Every night after the shooting has stopped, the people of the wardrobe department go to work cleaning spots and mending torn places so that the costumes will be fresh and in good shape for the next day's shooting.



The studio wardrobe experts design and make the clothes for the stars. Special screen tests are often made of the costumes to be sure that they photograph well. Certain colors are chosen for the same reason. Pale blue is always used instead of pure white because white reflects so much light that a white dress would look blurry at the edges—the way the sun does. Dark blue and dark red are used instead of black because black absorbs so much light that the details of the costume would be lost.

The costume departments have exact replicas of the stars' figures on which they fit clothes. This saves a good deal of time for the studio and wear and tear on the stars. The movie clothes of the stars are the most carefully made in the world, for a very simple reason. When you see them in close-ups, they are enlarged so many times that the smallest stitch that showed would look like a clumsy knitting stitch. For the same reason, only the best possible materials are used.

These clothes are cleaned and repaired every night. If the costume is to be used in several scenes, duplicates are made. This saves time in case the original costume gets soiled or torn during shooting. If there were no duplicate, the whole picture might be held up until the costume could be fixed.

Every day before the shooting starts, the cast must report to the make-up department. Since shooting usually starts at nine, the make-



up department is often hard at work before the sun is up.

The make-up man is something of a magician. His shelves are loaded with paints, face creams and lotions, switches of hair and boxes of eyelashes, lumps of putty, rubber molds, rolls of transparent tape, dye and eyeshadow, mascara, powder, lipsticks, pencils, and brushes of all kinds. With these things he can transform one face into almost any other that he wants.

One of the everyday problems of the make-up man is making the faces of all the main actors approximately the same color.

To take a picture, the cameraman has to let a certain amount of light fall on the film. This is called *exposing* the film. Dark things need more light—and so a longer exposure—than light things do. Since no two skins have the same tone, the cameraman would not know which one to expose for in close-ups if each face was made up in its own tone.

If the leading lady had a very fair skin and the cameraman exposed the picture for that, the leading man might look like an Indian. If the cameraman exposed for the leading man's skin, the leading lady would look as if she had been dipped into a flour barrel. Since red photographs very dark, people with red cheeks would look as if they were wasting away with disease. The make-up of the leads must all be of a similar tone, and it must be heavy enough



CASTING, COSTUMING, AND MAKE-UP

to cover any bumps, scars, and freckles.

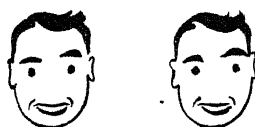
The make-up man's hand cannot wiggle the least bit because the picture on the screen is so large that the tiniest smear of lipstick would look enormous. The heroine's long eyelashes must be stripped carefully into her real ones.

The make-up man uses three tones of paint: one for the base, a lighter one for highlights, and a darker one for shadows. If you look at the pictures, you'll see some of the tricks he can do with these three tones.

He can take away a double chin.



And make a nose look wider or narrower.



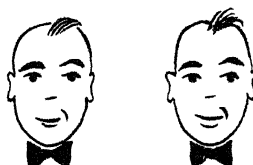
And make a face look fatter or thinner.



Or make the cheeks look hollow.



Or make the actor look very tired.



If he wants to make eyes watery, a whiff of menthol or camphor in an inhalator tube will do the trick. If an actor cannot cry, he is supplied with tears of glycerin or plain water.

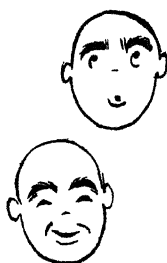
Rubber is one of the make-up man's best assistants and has generally replaced putty, which either melts under the lights or stiffens and cracks. Rubber molds with feather-thin edges can be put over any part of the actor's face and stuck there with spirit gum. Once make-up is blended over the edges, you can never tell where the actor starts and where the rubber stops.

To make eyes slant, rubber molds of the right shape are made to fit right over the player's eyelids. Then the edges are stuck with spirit gum.

If an actor is supposed to have a bald head and he hasn't, his hair is cut close and a shiny false bald head is fitted over the top. Then the edges are blended and perhaps a fringe of crepe hair (which is what false hair is called) is added.

For making scars, the spot is painted with collodion and the skin pinched together underneath it. The collodion holds it that way when it dries.

When the movies were young and the make-up man wanted to give an actor lines in his face, he just drew them on with a pencil. But the camera has a very sharp eye and the lines looked like pencil. Now a cast is made



CASTING, COSTUMING, AND MAKE-UP

of the actor's face and, from this, rubber pieces are made with wrinkles on them. These pieces are featheredged, and the whole piece is then stuck onto the actor's face with spirit gum.

The complicated make-up used in horror pictures may weigh several pounds and take hours to apply. It is so uncomfortable, besides, that the actor wearing it probably feels like scaring everyone who looks at him. But no matter how complicated it is, it must not interfere with the actor's speech. Rubber face molds give the actor much more freedom of expression and facial movement than any of the old methods.

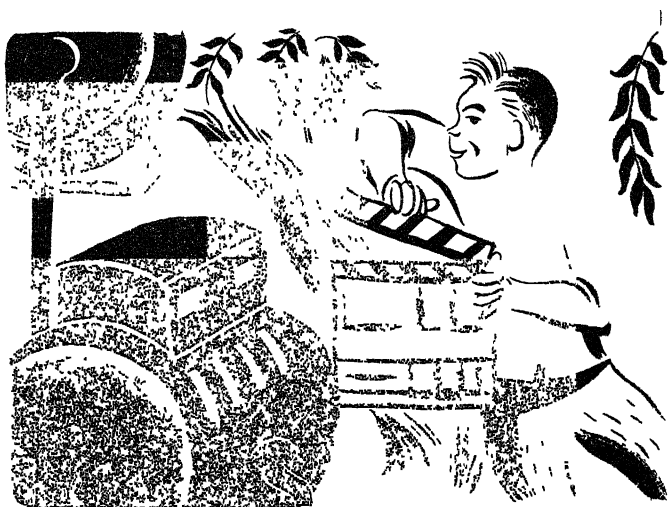
Once the big lights of the set are turned on, no make-up is comfortable, and faces begin to get hot and shiny in a very few minutes. Between takes, the make-up man's assistant has to dash out onto the set with a cloth and a powderpuff to pat the actor's face dry and apply a new film of powder. Even if the actor is playing the part of a swashbuckling pirate, he has to have his nose powdered dozens of times a day.

Now the cast is dressed and made up. The call sheet says they are to be on the set at nine o'clock to shoot Scene 32. The weeks of getting ready are over, and the shooting is about to begin.



Reel Six

START SHOOTING



THE set has been assembled and is all dressed. The electricians have moved in and are rigging the lights. Some of the lights stand on the floor, some are on platforms, and the rest are on the overhead rigging. There are lights everywhere, all sizes and shapes of them, from the brightest arc light to the "inky-dinky," which is about as big as a grapefruit. Movie people call all incandescent lights "inkies."

Usually there are 50 lights or more lighting a set. Heavy cables connect them to the studio powerhouse or to a jenny housed in a trailer and parked alongside the stage. For individual "setups" such as a shot of someone opening an icebox, there may be no more than five or six lights used.

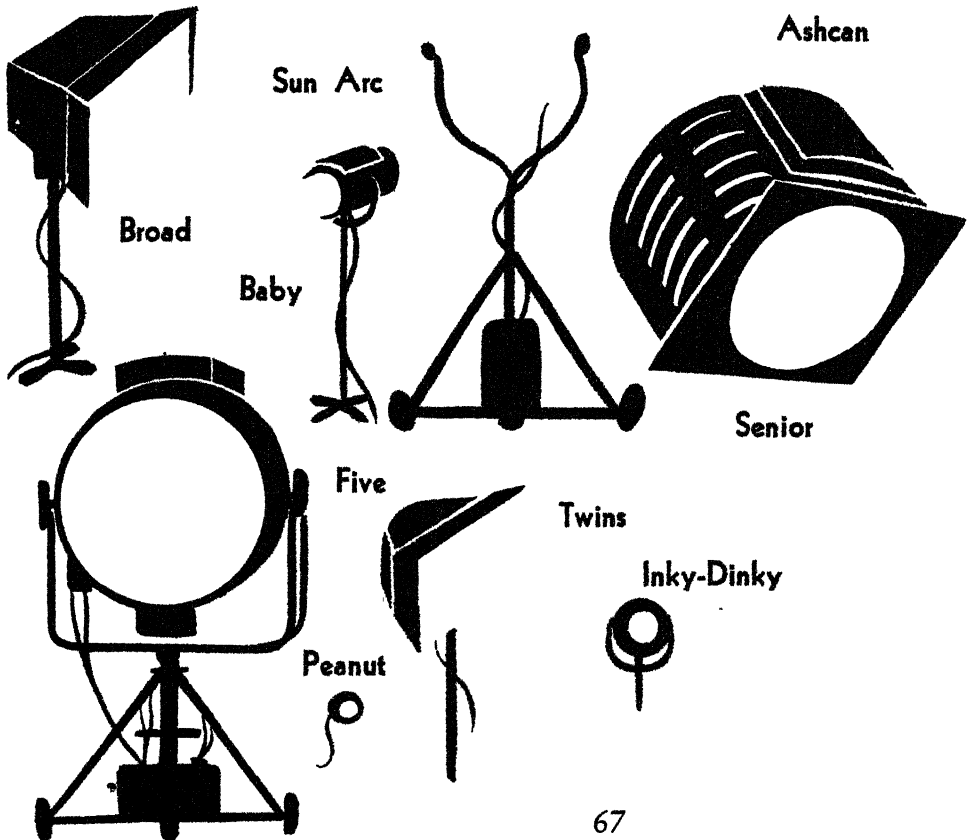
The cameraman, the director, and the set lighting foreman, who is called "the gaffer," direct the placing of the various lights. The

START SHOOTING

gaffer's assistant is called the "best boy."

Where tremendous amounts of light are needed, big arc lights, called *sun arcs*, are used. These sun arcs are two feet across. The big spotlights are incandescent lamps just like the electric lights in your house, but while you probably use a 60-watt bulb, the big inkies are 5,000 watts.

Between the biggest light and the smallest "peanut" (an inky about the size of an orange) are other arc lights and inkies of every size and shape. Nothing is more important in



START SHOOTING

making movies than good lighting. Dark shadows make a mystery scene more mysterious and bright lights make a scene gayer. If the light is too harsh for a particular scene, special screens called *diffusers* are used.

Some are made of colored cellophane or gelatin and are known as "cellos." Some, called "butterflies," are made of layers of the finest silk. Some of the screens look like spun sugar candy; they are made of glass drawn as thin as a spider web. And some are like barn doors that open and shut when more or less light is needed. These are even called "barn doors." Sometimes the grips hold huge round shades like firemen's nets to soften the lights. When the lights are all on, ventilators keep the stage from getting too hot.

The day's work for everybody on the set is guided first by the call sheet, then by the shooting schedule. The call sheet tells them when to be on hand, what scenes are being shot, who will be needed, and what equipment is called for. The call sheet looks like this.



CALL SHEET

DATE 11/24/44
 PICTURE *Mamie W. Muu* DIRECTOR *Rome Beau*
 SET Outside of *Fountain*
 LOCATION STAGE 9

NAME	TIME CALLED	CHARACTER	DESCRIPTION	WARDROBE
	ON SET MAKE UP			
Joanne Beau	9 30 AM 8 00 AM	LOUISE	W W W W W	BED ONE OVER
Robert Beau	8 30 AM	MARGE	W W W W W	W W W W W
STAND-INS	8 30 AM 8 00 AM	WARDROBE	ASTOLD	

START SHOOTING

You can see that there's no chance of anyone's making a mistake about when and where he is supposed to be. When the shooting is set for a certain time, everything must be in place by then. There is no time to go back for anything or to get a new idea suddenly about arranging the lights.

It is the job of the assistant director to see that the lights, the microphones, and the camera are in place and that the actors and all the helpers are ready. The director must be free to concentrate on the acting, on the movie itself, and he hasn't time to worry about the details.

This sounds easy, but it is the biggest single job in movie making. Because pictures are taken in a jumble of scenes from the middle, the end, and the beginning, the director has his work cut out for him. Every time he directs a scene, he must be thinking of the scene that will come before it and the one to follow. They must all flow together smoothly and excitingly as if they were being done in the order in which you see them on the screen. Sometimes scenes that you see one after the other are shot months apart, but if the direction is good, you won't notice the slightest change in the mood of the picture.

Everybody else has a *definite* job to do. The gaffer knows exactly how to place his lights to get a certain effect. The cameraman knows exactly how much to open or close the lens,



how to focus it, or tilt the camera to get the picture he wants. The sound man knows exactly where to hang the microphone so that the voices will sound best. But the director has to *feel* the picture bit by bit as he goes along. It is like trying to put a complicated puzzle together without having a picture of the way it is supposed to look in the end.

When the mike and the camera are in place, one must usually give way to the other. If the mike is in the place where it will catch the sound most perfectly, it is probably sticking into the picture. Either the mike must be moved or the cameraman must change his angle. They usually end up by doing a little of each.

After the equipment is set up, a complete "walk-through" rehearsal is held. The cameraman watches through the finder of his camera to be sure the actors stay in focus and in a pleasing place in the frame. The sound "mixer," who sits at his controls on a sort of wheeled desk on the set, listens through his headphones to be sure the voices are coming through perfectly.

The second assistant cameraman carefully checks the focus with a long tape to be sure it is perfect. The make-up man puts last-minute touches on the players' make-up.

The assistant director yells, "Everybody quiet!" and blows a whistle.

The director says, "Roll 'em."



START SHOOTING

The mixer flashes a signal to the man in the sound recording room, which is not even on the stage, and the recording man pushes the button that starts the camera and the recording equipment. When they are running together at the same speed (24 frames a second) the recordist hits the buzzer and a light flashes on the mixer's console. The mixer calls, "Speed."

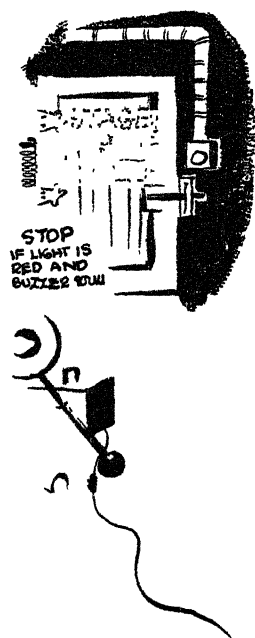
The director says, "Action."

An assistant steps in front of the camera with two hinged boards, called a clapper, which he bangs together with a sharp clack. The clapper is fastened to the top of the slate. On the slate is written the director's name, the cameraman's name, the number of the scene, and the number of the take. The assistant says, "Scene 32, take 1," then bangs the clapper and steps away.

All over the set red lights glow. Outside the stage a red light and a buzzer warn that a take is in progress.

This is it. The shooting has started.

The script girl keeps a careful record of every scene, starting with the identification number. She writes down all the details, not only of the action but also of the props and costumes, too. This is important, because it may be weeks before the following scenes or the ones that are to appear before it are shot, and of course, all the details of the scene must match. •



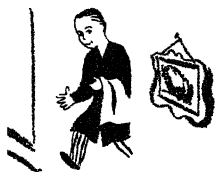


The heroine shouldn't have on brown shoes in one shot and white shoes a second later, but if you watch carefully, you will see that sometimes this does happen. It means that the script girl wasn't so careful as she should have been.

In addition to the record kept by the script girl, the still cameraman takes pictures of the set and action. These are good records, too, in case there is a break in time between the shooting of scenes that are part of a single incident. Movie-goers are quick to notice the kind of boner that happens when the records are not well kept.



Once, in a picture, an actor rushed through a door with a striped bath towel over his arm. That was the end of the shot. It was days later before the shot was taken of him rushing out the other side. He rushed through the door with a striped bath towel but came out the other side with a plain one. Thousands of people noticed the boner and wrote letters to the studio about it.



The first shot is called the master shot and is taken just the way it appears in the shooting script. Sometimes it will be taken over and over again, half a dozen times or more. The director may not like the way an actor sits down in his chair, the tone of his voice, or even the way he strikes a match to light his pipe. He might not like one small motion made by somebody in the scene.

Sometimes even if the shot is only two lines

START SHOOTING

long, the director will find a dozen things wrong with the way the actors are doing it. Most directors try to make each shot as perfect as possible. Bad shots are like wrong stitches knitted into a sweater.

After the master scene is shot, the cameras and lights are changed and the scene is shot again and again from different angles.

First the director might take a close-up of the hero speaking the lines that are the climax of the picture. Then he might take a long shot of the hero and the crowd to which he is

A Close-Up



A Long Shot



A Medium Shot

speaking. Next he might do another take, letting the camera roam from face to face among the listening people. When the director is shooting the picture, he doesn't know which shot will fit in best, so he takes them all.

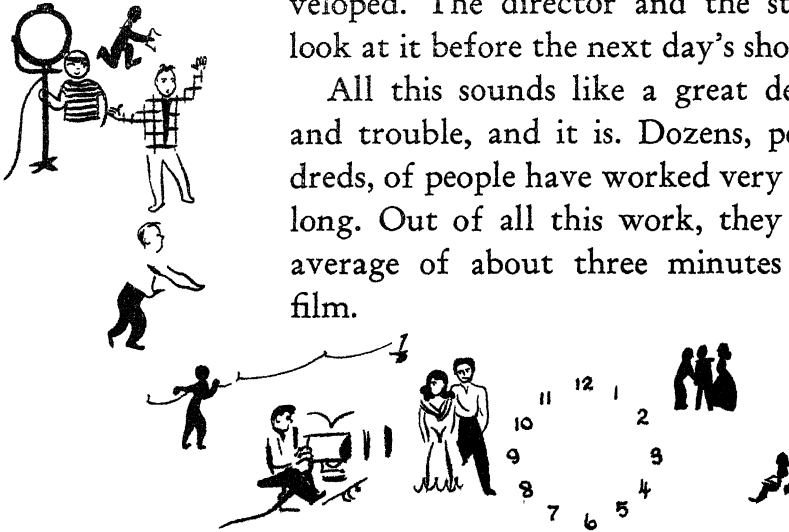
At the end of each take the director says, "Cut," and the shot is over. The assistant director yells, "Kill 'em!" and off go the lights.

Those scenes which the director thinks will be best are marked "print," while the ones he's not sure about are marked "hold." At the

START SHOOTING

end of each day's shooting and after the director calls, "Wrap it up," all the film that has been marked "print" is rushed away to be developed. The director and the stars have to look at it before the next day's shooting starts.

All this sounds like a great deal of work and trouble, and it is. Dozens, perhaps hundreds, of people have worked very hard all day long. Out of all this work, they produce an average of about three minutes of finished film.



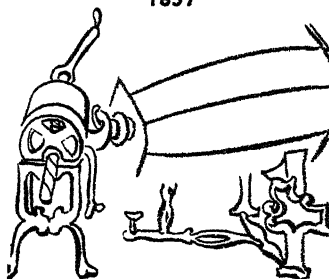
Reel Seven

THE SOUND

THE moving pictures grew for thirty years before they became talkies. The strange thing is that there was no reason for this. Talkies of some kind were possible from the first moment the movies were invented. As a matter of fact, sound recording is older than the movies.

It began with the phonautograph, which was patented in France in 1857, before our own Civil War. The phonautograph was a barrel-shaped cylinder with a diaphragm at one end. A needle point was attached to the middle of the diaphragm. When words were spoken down the barrel, the diaphragm and the needle vibrated back and forth. The point of the needle rested against a turning cylinder that had been coated with lampblack, and as it wiggled, it made scratches in the lampblack. That was the first phonograph record. The principle is exactly the same as the one we use

THE PHONAUTOGRAPH
1857





today in the making of our modern records.

The next step came in 1877 when Edison invented his phonograph. Instead of just wiggling against a sooty surface, the vibrating needle on Edison's machine cut grooves of varying depth in a cylinder covered with tinfoil. The first phonograph records were all cylinders instead of being flat like records today.

The first talkie was shown in Paris in 1892. It was a lantern-slide show accompanied by a voice on a phonograph, describing the pictures on the slides.

Then came all sorts of gadgets that made all kinds of noises. Theaters had sound-effects men like the ones radio stations have today. The sound-effects man sat down below the screen, surrounded by all sorts of props for making noises, and watched the picture very carefully. If a gun went off, the sound-effects man fired a blank cartridge pistol into the air. If there was water in the scene, he had a bucketful to splash. He made running and stamping noises with his feet, and he had a little door to slam. He was a very busy man, from the beginning of the picture to the end. Not all movie theaters had a sound-effects man, but almost all did have someone who played the piano to suit whatever was happening on the screen.



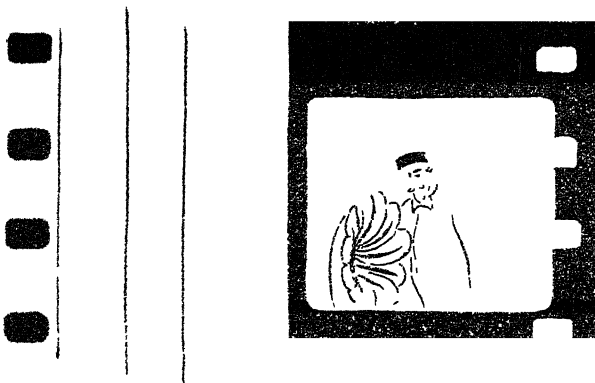
In 1908, came the cinephone. First a record was made of all the talk and noises in the pic-

THE SOUND

ture. Then the actors were drilled over and over to act in time to the voices, even to moving their lips so it looked as if they were really saying the things on the records. This method of recording the sound and then making the picture to fit is still used in animated cartoons and in the singing parts of regular movies.

During these first years of experiments with movie sound, a man at the Edison Laboratory was trying to work out a way of *photographing* sound along with the pictures. This man was Eugene Lauste. He is called the father of the sound film.

Eugene Lauste took out the first patent on his method in 1907. In 1910 he made the first sound pictures with the sound printed directly on the motion-picture film. He even worked out the two kinds of pictures of sound—called *sound tracks*—that are used today.



EUGENE LAUSTE AND
THE FIRST PHOTOGRAPHED
SOUND TRACK

While Lauste was working here, Gaumont in England and Von Nadler in Germany were also inventing ways of photographing sound. Strangely enough, no one seemed in the least interested in talking pictures. People did not go to the movies to be talked at; they went to watch, and they thought silent pictures were more restful. They didn't mind someone playing the piano or a sound effect or two, but they didn't want to listen to a lot of talk.

The inventors went right on working. In 1904, an invention that really had nothing to do with the movies made possible our modern sound pictures.

This invention was the Fleming valve. It was originally used to pick up radio signals. The Fleming valve was an electron tube, and what it did was this. It amplified, or magnified, tiny amounts of electric current into much larger amounts. Two years later, Lee De Forest added to this electron tube a means of controlling even the tiniest changes of current through the tube. Electron tubes like this are the heart of the radio set, and they are the heart of movie sound recording, too.

Eugene Lauste had used a mechanical shutter that he opened and closed to allow varying amounts of light to fall on the film and record the sound. In 1913 Elias Reis made a sound record on film by using a controlled current that had passed from the microphone through one of these electron tubes. The electron tube



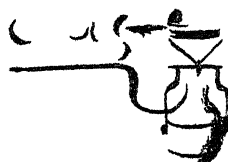
THE SOUND

controlled the recording much more accurately and delicately than a mechanical shutter ever could. Elias Reis's system was almost exactly like the perfected one we use now.

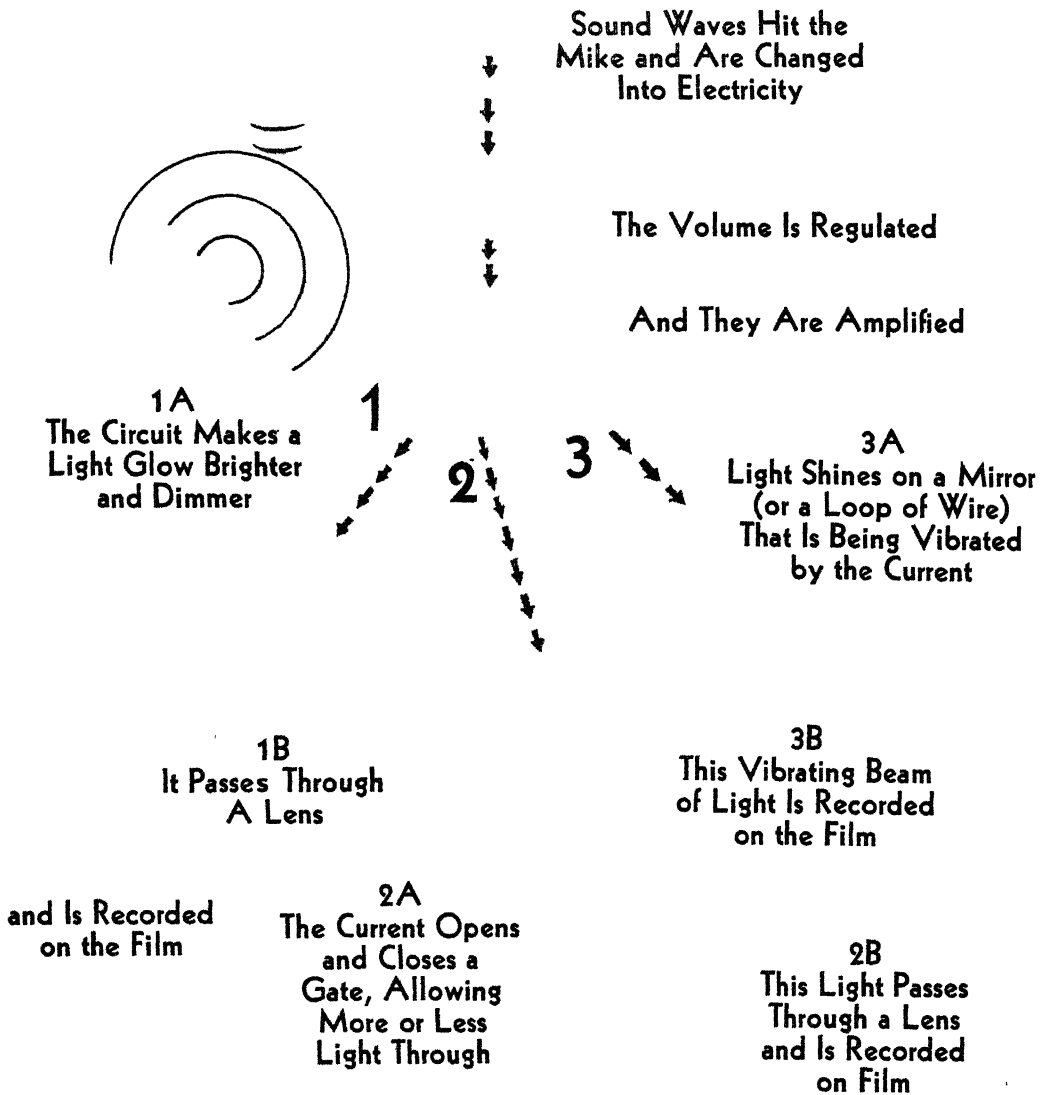
There are several different systems of sound recording used today, but they all work in the same general way. When the actors talk, the sound waves made by their voices hit against a very thin metal ribbon or disk in the microphone. The sound waves bouncing against the disk cause it to move back and forth quickly. For each sound the actor makes, this disk—called the *diaphragm*—vibrates in and out. If the sound is loud, it moves a lot. If it is faint, it only moves a little. In the mike, these vibrations of the diaphragm are changed into electricity. The more it moves, the more electricity flows out of the mike. The microphone is changing sounds into electric currents, and these currents are really the actors' voices in a different form.

Because even the loudest sound makes only a very weak current in the microphone, it is necessary to magnify it. From the microphone the current flows right into an amplifier. The amplifier contains a number of electron tubes whose job it is to make big currents exactly like the little ones. The amplifier is a sort of magnifying glass for electricity.

Now this strong electric current goes from the amplifier to the recording device. Here another change takes place. The electric current



SOUND IS RECORDED IN ONE OF THESE WAYS



IN EACH OF THESE METHODS SOUND IS CHANGED TO ELECTRICITY, THEN TO LIGHT, THEN TO A PICTURE ON FILM

that started as sound waves is about to change its form again and become light waves. The electric current enters the recorder and, depending on the type of recorder it is, does one of three things.

1. It may light up a special electric-light bulb, which glows brighter or dimmer, depending on the strength or weakness of the current. The light from this bulb is projected through a lens onto a strip of film that is passing in front of the light. It is recorded on the film as brighter or darker marks, depending on the brightness of the light. This kind of sound track is called the *variable-density* sound track.

2. Another kind of recorder has a small gate that opens or closes when the current goes into it. This slit is smaller than almost anything you've ever seen. It is only $\frac{1}{1,000}$ inch wide and $\frac{7}{1,000}$ inch long. Behind the gate is a bulb of constant brightness. The light from this bulb has to go through the gate in order to shine on the film. If a strong current opens the gate wide, a lot of light falls on the film. If the current is small, the gate doesn't open very wide and less light gets to the film. The different amounts of light falling on the film make it darker or lighter. This makes a variable-density sound track, too.

3. The other method of recording sound is called the *variable-area* system. The current vibrates a loop of wire that has a mirror at-

tached to it. The vibration matches the current coming into the wire. A beam of light aimed at the mirror is reflected from it onto the film in jiggling lines that match the vibrations of the mirror.

You can't hear the difference between the two kinds of sound track but you usually can tell which one is used in a picture by looking at the screen credits. If they say, "Recorded by the Western Electric System," the sound track is a variable-density one. If the screen credit says, "RCA Sound System," the sound track is of variable area. But no matter which kind of sound track is used, it is always a picture of sound recorded on film.

During the making of a movie, the sound and the pictures are recorded on separate films so that changes in either can be made easily. If they were both on the same bit of film, you couldn't change one without changing the other. If you cut just a few frames out of the picture, for instance, a word or part of a word of the sound will come out too. Of course when the film reaches your theater, the sound track and picture are together on the same film.

Have you ever noticed how sometimes when you are seeing an old movie the sound is jerky and the words incomplete? The film has worn and broken and when it was patched together little pieces of the sound track were covered or missing. The pictures that follow

**VARIABLE DENSITY
SOUND TRACK**

**VARIABLE AREA
SOUND TRACK**

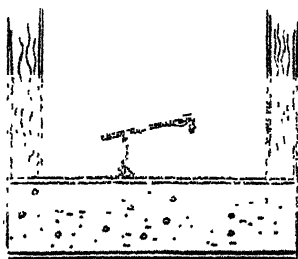
THE SOUND

one another are so much alike that your eyes don't notice the missing ones unless there are quite a few of them, but there is so much variation in every fraction of the sound track that your ears pick up the least break in it.

When the sound track is spliced together during the editing of a picture, a special patch, called a *blooming patch*, is put over the joined places so that they don't make a noise. If these patches are not put on properly you can actually hear the splices. Sound men call these noisy splices "bloops."


Motion-picture sound equipment is so delicate that the studio sound stages must be specially built if the sound is going to be perfect. Some sound stages are as big as a ballroom and some are as big as a city block. Whole sets are assembled inside these sound stages.

The walls are double, with insulation between them, so that no sound can get in from outside. The floors are double, too. First there is a subfloor; then there is a thick layer of cinders, rock dust, or sand; and finally the real floor of the stage is "floated" on this. It is very important for both the sound apparatus and the cameras that the floor never vibrate, as it might if heavy trucks were passing. The subfloor and the cinders absorb vibrations the way the springs of an automobile take up bumps.

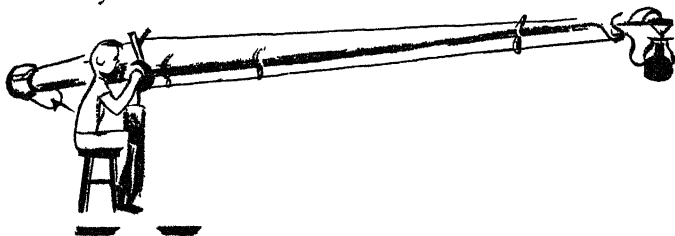


The walls are covered with cloth called *baffle blankets* or with special boards. These

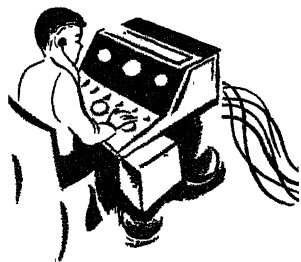
THE SOUND



absorb the sound waves like a huge blotter and thus keep them from reflecting back onto the set. The stage is so large that if the walls did not absorb sound there would be echoes. Sometimes portable walls, called *baffles*, are put up directly around the set itself.



The star of the whole sound system is the mike, and no leading lady was ever treated more carefully. The mike is swung on a boom like a heavy fishing pole, and the whole thing is mounted on a wheeled dolly. The mike man can reel the mike in or out like a fish, raise or lower it, or swing it in any direction. But he must always keep it out of sight of the camera's eye.



The mixer is the boss of the sound. He sits on the set at his wheeled console, which has outlets for four to six mikes and volume controls called "pots." The mixer wears a special set of high-fidelity headphones, costing about a hundred dollars, through which he listens to the sound.

On his console is the telephone that connects him to the recording-room offstage. Sometimes the recording room may be blocks

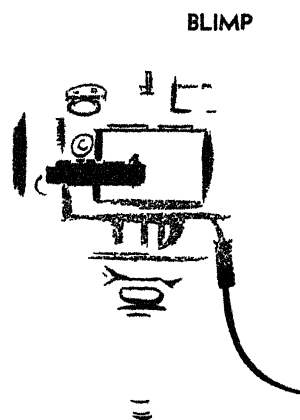
away. Other times the recording apparatus is in a trailer, hooked into the stage from just outside.

At the beginning of each day and after lunch, a sound test is made. One of the assistant sound men steps into position under the mike and says, "Sound test. One, two, three. . . ." While he is counting, the mixer checks his controls and okays the sound for value. The only sound he hears is that picked up by the mike.

If the mixer has any remarks to make, he usually makes them to the director or the assistant director, and occasionally to the actors if he wants them to speak more loudly or more clearly. He listens, too, for noises that may spoil the take. The mike will pick up the noise of a jingly bracelet, a squeaky shoe, or a piece of paper rattling offstage. Even the motors on the camera must be silent; that is why the cameras are housed in their big soundproof blimps. Unwelcome noises coming through the sound system are called "mike stew."

In the recording room the recordist has threaded the film and adjusted the controls and light valves. When the director and the cast are ready for the take, the mixer signals the recordist who starts the camera and the recording equipment.

It may seem odd that the recordist, who can't even see the set, starts the camera. It is very important that the picture film and the



sound track match exactly, and it is, therefore, safer to have the same person start them both.

After the master scene has been shot and the director starts shooting the scene from different angles, he must be careful about the sound. He usually sees to it that the last few words of the dialogue in one shot and the first few in the following shot of the same scene overlap. If this is done, the little bits of the sound track can be spliced smoothly together the way the different picture shots are.

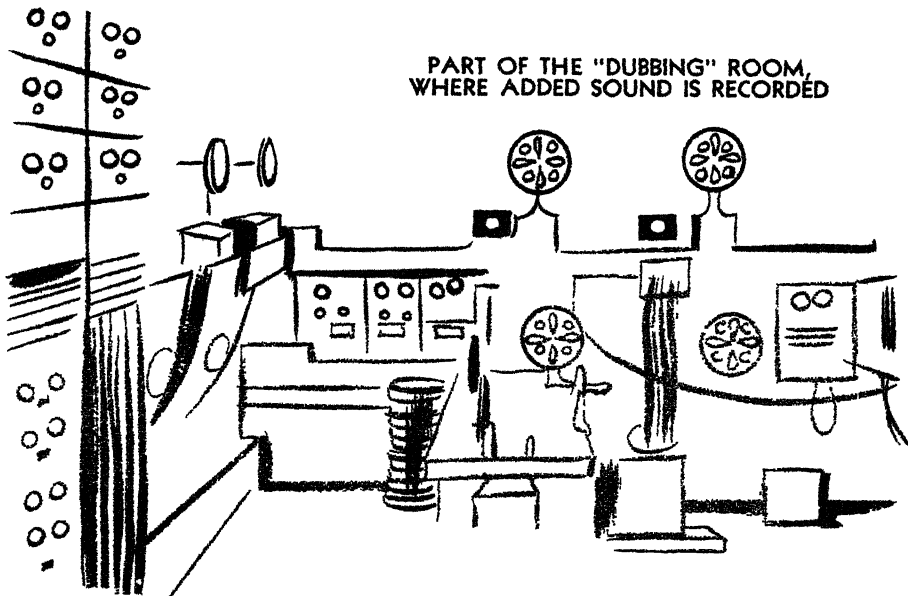
Only the dialogue is recorded at the time the picture is made. It is recorded not only on film but also on an acetate record. The latter is made in case the director wants to hear the dialogue recording right away without waiting for the sound track to be developed. The music, the sound effects, and even the singing are recorded separately—all for very good reasons.

Most pictures have some kind of musical score that runs along with them. There is usually music during the moments when no one is speaking, and sometimes it is even used as a background to voices. If the music were recorded during the picture on the same sound track with the dialogue and then if a few feet of the action and dialogue were later cut out, whole bars of the music would be missing. The break would be very noticeable and unpleasant.

THE SOUND

If the music is postscored, or added after the film and dialogue are finally cut, it will run smoothly through the picture. The same is true for other background noises that have a noticeable rhythm, like the breaking of waves on a shore or the click of train wheels. Another advantage to postscoring music is that it can be made very faint, behind voices, or brought up tremendously at dramatic moments in the picture.

Sound effects, too, are postscored. If they were recorded with the dialogue, they might be hard to control, badly timed, or so loud that they would drown the voices out. If the script called for a dog barking, it might be pretty hard to make the dog understand how loudly or softly to bark or to make him start and stop at exactly the right moments.



THE SOUND

Then, too, the mike records exactly what it hears. The director might want the sound of a revolver shot to be faint, as if coming from a distance, or the chirping of crickets to sound louder than the voices. If the mike were tuned to the voices, it would hear the other things only as they sounded by comparison. But if the sound effects are recorded afterward, these things can be easily regulated so that they sound just right.

Singing is recorded separately for still another reason. It might take all day and dozens of takes until the director was satisfied with the scene in which the song appeared. Even the greatest singer in the world couldn't sing the same song perfectly dozens of times a day. So, on a day when he is in fine voice, he and the orchestra get together in the scoring room and record the song. Later this record is played back into the sound track of the film in the place where you see the actor singing.

Another reason for doing this is that when the actual scene is taken the actor does not have to distort the muscles of his face and neck as he must do when he is really singing. He just forms the words with his mouth. Many players who don't have good voices often "dub" to recordings of other people's voices. How many times have you watched a movie of a star singing and whispered, "Well! You can see *she's* not singing!" She never is.

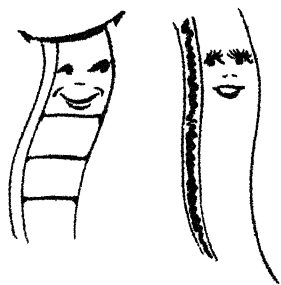
It is much harder to get a good sound track



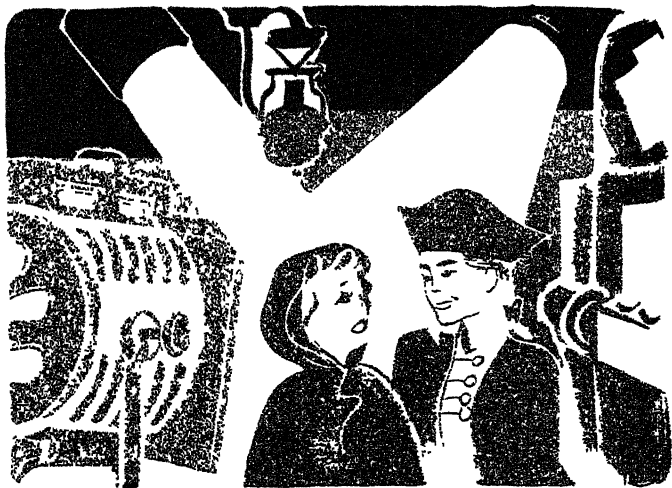
THE SOUND

on location than in the studio because all sorts of accidental noises can spoil the take. Once a whole company had to wait for a few bumblebees to move on to another field.

A picture always has at least three separate sound tracks: dialogue, sound effects, and music. Some parts of a picture may have ten or twelve tracks with each sound effect on a separate one. One picture had twenty-two separate tracks at one point. The more of these that can be combined by re-recording onto single sound tracks before the final re-recording is made, the easier that last big job is. When the sound track and the film are finally put together, they have been "married."



Reel Eight
THE ACTORS



OF ALL the people who make the movies, the actors are the ones you know the best. After you've seen them in several pictures you feel as if you do know them. They are almost like real friends.

A movie actor or actress is chosen first not for an ability to act but rather for a personality that comes over well on the screen. He must seem real, and you must remember him. Being handsome or beautiful hasn't got much to do with this either. Sometimes the most beautiful girls do not photograph well, while others who are not even pretty may look lovely on the screen.

As the movies grew up, the requirements for movie actors and actresses changed. In the beginning, the actors were just anyone who could do the things called for in the script. Sometimes they were people who happened to be passing along the street. Sometimes the

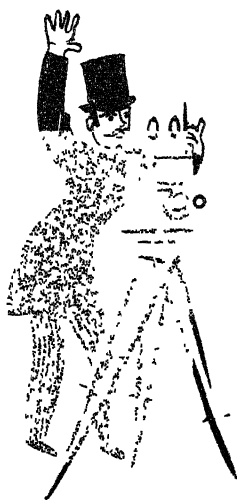
THE ACTORS

cameraman and the director took turns being actors. For a long time, all the members of the crew had to be ready to jump in and take parts at a second's notice. They even did their own work dressed in the costumes for the picture.

Stage actors considered the movies undignified and refused to have anything to do with them. If an actor who was out of work and needed money took a part in a movie, he was very careful that none of his friends found out about it. He plastered on as much make-up as he could to prevent being recognized. Even Griffith shared the idea that any connection with the movies was something to be ashamed of and, for years, refused to use his own name.

At first, the names of actors and actresses never appeared in the movie "credits." After some of them had appeared in a number of pictures, people began to single them out. They talked about "the Biograph girl with the long curls" or "the very fat man with the top hat," and they wanted to know their names. Several things happened to make stage players change their minds about appearing in the movies.

The industry was growing, making money, and being accepted. Moving pictures had outgrown the little rooms and shabby halls that were their first theaters and moved into more elaborate quarters like those that housed plays. Then Sarah Bernhardt, the greatest actress of





the day, consented to appear in the movie *Queen Elizabeth*. Immediately, movies seemed quite respectable to other actors who had been looking down their noses.

Finally, two players became so popular that the public clamored to see them again and again, and their studios proudly proclaimed their names. They were Mary Pickford and Charlie Chaplin. Other studios began to bid huge sums of money for their services. Actors began to think that perhaps there was something in this motion-picture acting after all.

At first acting was very violent and didn't even try to be real. Directors thought that if the actors didn't do things twice as hard as they did in real life, the audience would never catch on. As a matter of fact, in the beginning, this was almost true. Cameras and film were so poor that the pictures weren't very clear. Besides, no one had got around to the taking of pictures close up, and since you saw an actress fuzzily and from a distance, how were you to know that she was upset if she didn't clap her hand to her heart and faint?

As cameras and films were improved and as the directors discovered new techniques for showing the performers, acting began to become more natural. In the ordinary theater, most of the audience sees the actors on the stage from a distance, so they do not always catch natural changes of expression. In the movies you see the actors not only close up but

THE ACTORS

also magnified hundreds of times, and then even the flicker of an eyelash is very plain.

At first, all leading men had to be tall, strong, and handsome, and all leading ladies had to have long flowing hair, big eyes, and a tiny rosebud mouth. Now there are as many different shapes and sizes of figures and kinds of mouths and hair as there are actors and actresses. Today, looking different from everybody else in the movies is much more important than looking the same.

In 1927, the talkies came along, and they changed everything. The actors could *tell* how they felt and what they were thinking instead of trying to show it all with expressions and gestures. For the first time voices became as important as looks, and hundreds of actors and actresses lost their jobs. It didn't do any good to be beautiful if you had a voice like a crow or an accent that made you hard to understand. Audiences wanted their stars to sound as well as they looked, and some of them just couldn't.

Stage actors suddenly were in great demand because on the stage good voices had always been more important than looks. A really lovely speaking voice can make you forget whether the person talking is good-looking or not, and so voices have become very important in the movies.

Animals are actors; too, and all kinds of them are carefully and patiently trained for



their work in the movies. Usually these animals are owned by their trainers. The trainers rent the animals to the studios when they are needed and go along to help them do their jobs. Often they obey their masters' directions right away, but sometimes they have to be coaxed. A dog who is looking pleadingly up into the camera is usually looking, instead, at a nice juicy bone hanging right above it.



A great many horses are trained for the movies. They are trained not only to rear and prance and do all the ordinary things a horse does but also to stumble and fall without hurting themselves or their riders. In westerns, war pictures, or pictures about racing, horses are stumbling and falling all the time. If they did not know their job, they might break their legs or roll over onto their riders.

There are all kinds of trained animals in Hollywood, from elephants to fleas. When they are used in a picture a representative of the Society for the Prevention of Cruelty to Animals usually checks up to see that they are not made to "act" by any means that can hurt them.

Actors are usually under contract to one studio, but sometimes an actor is "loaned out" to another studio to play in a picture. Studios don't mind lending actors because they can usually make a trade and get someone they need in exchange. Then, too, the other studio will be spending money and publicity build-

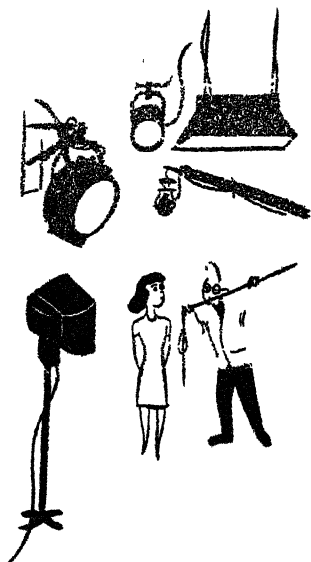
ing the player into a bigger star. Before a studio lends an actor, the studio has to okay the part he is going to play. If he usually plays a minister or a schoolteacher at his own studio, they would never lend him out to play the part of a gangster.

So many movies are made every year that the search for new actors and actresses never stops. The big studios have scouts everywhere looking for new people, but they find very few with possibilities. Thousands more people want to work in the movies than there is ever work for. Hollywood is full of waitresses and filling station men who came with the hope that they would be stars.

Besides the stars, the feature players, the bit players, and the extras, there are other kinds of actors in Hollywood. Some of these are stand-ins and some are doubles.

Every star has a stand-in, someone of the same size and coloring. They stand patiently in the star's place while the lights are being arranged and changed and changed back again and the camera angles are being checked. Stand-ins usually get the same pay as extras.

Sometimes they take the stars' places in the picture itself, but usually a double is used for this. If there are long shots in which you do not see the star very clearly and if there is any chance of the star's being slightly hurt in the scene, a double is usually called in to take his place.





Suppose in a scene the hero had to fight his way through an angry mob and he accidentally got a black eye. No other scenes could be shot until the black eye got better, and that might cost the studio a good deal of time and money. So instead of taking a chance, they use a double in the long shots.

Big fight scenes are almost always done by special fight teams hired for that purpose. The studios do this not only to spare the stars from possible damage, but also because spectacular fights with furniture breaking, people crashing through bannisters or falling downstairs are very complicated to plan and photograph. Rehearsals for them would take weeks. Fight teams have regular routines all set up, and so the scene can be done much more quickly.

When the script calls for the heroine to ski or play tennis and the star doesn't know how to do these things, in comes the double.

For really dangerous things, special stunt men are used. They know how to wreck automobiles, to jump from airplanes, or to swim through burning oil without hurting themselves. Actors are trained for acting, not acrobatics, and they couldn't possibly do all the things the stunt men do without getting hurt. They do learn things like how to fall down stairs without breaking any bones. But if you ever see the hero being dragged through the streets by a stampeding herd, the chances are pretty good that it really is the stunt man. If

the heroine has to dive from a high cliff, it probably is the stunt lady instead.

Stunt people get paid very high prices for taking these risks. The more dangerous the job is, the more they get paid for it, just as a man who drives a truck full of dynamite gets more than a man who drives a grocery truck. Sometimes, of course, even the stunt men get hurt, but usually they do their jobs as carefully and efficiently as any other technical expert on the set.

An actor's life is not an easy one. When he or she is making a picture, there isn't much time for fun. They must be up at the crack of dawn and in bed early, or they will be too tired to do their jobs next day. In addition to the main business of acting, their days are crammed full of all sorts of other things.

They have to do exercises to keep their figures trim. They spend hours with the hairdresser and the make-up man. They must pose for publicity pictures and have fittings on costumes. They must go to conferences and look at the rushes of all the scenes they acted in the day before. If those scenes are not satisfactory, they have to do them over. They must help their secretaries go over the mail. (Most stars get about three thousand letters a week and every one must be answered.) And finally, before they can go to sleep at night, they have to learn the lines of all the scenes that are going to be shot the next day.



THE ACTORS

Children in the movies have even more to do than adult actors because besides everything else, they have to go to school every day. The studios have special schools for their child actors, and they must learn as much as they would if they were going to regular school.

If a child is too young to read, someone has to read him the lines of his part over and over until he learns them. Child actors are not allowed to work as long under the lights as adults are. Babies can be on the stage during shooting for only a minute or two at a time. When the script has a baby in it, the studio usually looks around for twins to take the part so they can shoot first with one, then with the other.

The call sheet tells the actor what time to be on the set, how he is to be dressed, and what

SET Interior-Opera House

LOCATION Stage 1

NAME	TIME CALLED	CHARACTER	DESCRIPTION	WARDROBE
	ON SET MAKE-UP			
Dot Louis	9.00 A.M. 8.00 A.M.	Merry Jones	Shy young dancer	White tulle ballet dress- pink slippers black velvet cape

scene is going to be shot so that he will know his lines. It isn't just a question of learning a few lines a day and then saying them. The actor must read the script over and over so

THE ACTORS

that he really *knows* the character he is going to play. He must know what kind of person he is portraying—what he thinks and what he is likely to feel about the things that are happening. All of this is very important because sometimes the actor must start acting a scene right in the middle and he must still be able to get the right feeling into it. If he isn't well acquainted with the person he's supposed to be portraying, he can't make *you* feel as if the person is real.

There are a number of other things besides his lines that a movie actor has to remember, even during the shortest shot. He has to remember the instructions the director gave him during the rehearsal about the way each word was to be spoken, each movement made. He has to remember the cameraman's chalk marks on the floor and not to move out of them. Those chalk marks show what is in focus.

If you've ever looked through opera glasses or a telescope, you know that the whole scene may be blurry; but as you adjust the lenses, everything gets clearer and clearer until it is perfectly sharp. That perfect sharpness means that the glasses are in focus; but if you turn them the slightest bit either way, the focus will be less sharp. If you focus the glasses on something quite distant, things closer to you will look blurry, and of course the opposite is true too.



OUT OF FOCUS



IN FOCUS

THE ACTORS

When the cameraman focuses the movie camera lens on a certain spot, only a few feet either way are in focus. Anything outside of that area won't be so clear. Have you ever noticed in a close-up that the background is often quite indistinct? The area that is in focus is carefully marked off on the stage with chalk and if the actor steps outside of the line, he's out of focus.

He has to remember how near the mike is, and he cannot speak louder or lower than he did during the sound rehearsal because the recording machine is adjusted to that volume.

He has to remember how the lights are placed so there won't be ugly shadows on his face or on the background, and so he won't throw his shadow right across one of the other actors. If he is always getting in the other players' way and taking up more of the shot than his part calls for, they call him a "lens hog."



THE ACTORS

Even if he suddenly thinks of a bit of acting that might make the part much better, he can't do it until the next shot. During each shot, everybody on the set must know just what he is going to do.

It's hard for an actor to remember all these things all the time. If his part is really well done, you must forget that he is an actor and that you are watching a movie. He must be a real person, and you yourself must feel a part of what is happening to him.





NEXT to the director, the most important man in making a movie is the cameraman. The most important machine in Hollywood is the camera. The camera is the window through which you may see all the fun and excitement of the movies and all the places and events in the world around you.

The head cameraman is called the *director of photography* or the *cinematographer*. He doesn't take pictures at all. His helper, the *operative cameraman*, does that. But the head cameraman probably took millions of feet of film before he got to be a director of photography, and he knows all there is to know about the camera.

The director of photography works with the picture from the beginning, when the sets are being planned. He helps to plan sets that will photograph interestingly, and then later

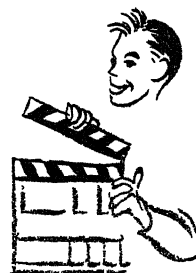
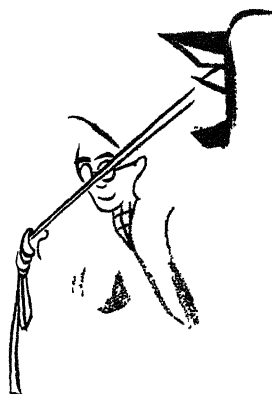
THE CAMERAMAN AND THE CAMERA

on he directs the lighting. He plans the camera angle of each shot and any movement of the camera.

The operative cameraman handles the camera itself and takes the picture. The first assistant cameraman takes care of the camera. He sees that it is in good working order, and he loads and unloads the film. He measures the distance between the lens and the actors with a long tape measure so the camera can be focused exactly. Sometimes the pictures are magnified to more than forty thousand times their size, and if the focus isn't perfectly sharp the pictures will look blurry.

Another assistant cameraman holds the slate at the beginning of each scene and writes a careful report of each scene for the editor and the laboratory. This report includes the exposure, the number of the take, the type of shot, and the number of feet of film in it. These reports are fastened right onto the camera. When the day's shooting is over, they go out with the film. The operative cameraman and his assistants are called the camera crew

The director of photography has a number of problems. He must take a tiny rectangle of film, $\frac{5}{8}$ inch high and $\frac{7}{8}$ inch wide, and fill that space with a perfect picture. Different shots and scenes must flow into one another smoothly so that you won't be sharply aware of the change from shot to shot or between camera positions. This means that, even if



shots are days apart on the shooting schedule, if they are to follow one another on the screen, they must have similar lighting and a pleasing combination of camera angles.

Still photographers can retouch a picture if there is an unpleasing line or shadow in it, but there is no retouching on movie film. Each frame must be perfect.

The head cameraman directs the lighting. Good light is the most important thing in a good shot. Every frame of film is a scene painted with light. The head cameraman must know which lights to use and how to place them to get the picture he has in mind. He must also plan the camera angles to get the right feeling and atmosphere into each shot. For instance, weird, unusual angles can give a scene a frightening quality while a simple long shot might make the same scene look quite peaceful.

Because it is very hard to light a scene exactly right, more than one camera is seldom used. It is quite a job to light a scene so that it looks well from two angles. Two or more cameras are used only for big scenes that cannot be done over. Battles, fires, stampedes, and balls are usually covered by several cameras from different angles. Generally there is so much light on these scenes anyway that it doesn't matter.

After the lighting is arranged, the cameraman takes an exposure meter, a little gadget



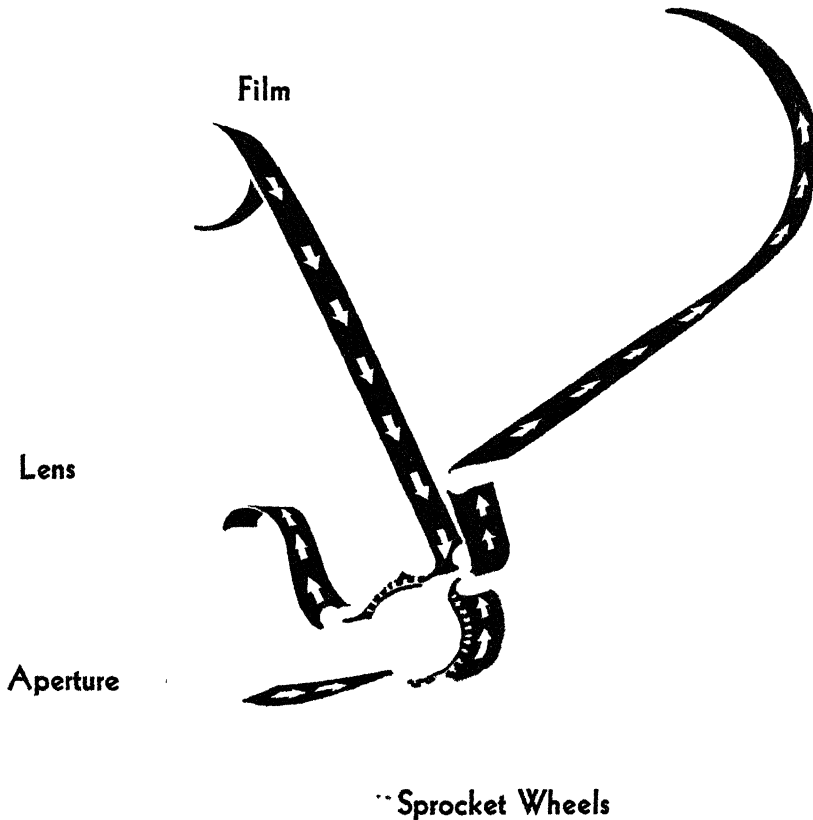
THE CAMERAMAN AND THE CAMERA


for measuring amounts of light, and holds it in front of whatever the camera is focused on. From the meter readings he knows how much to open and close the lens of the camera to get the best picture. Even if the cameraman has been taking pictures for forty years, he never guesses. Nothing is left to chance.

The picture shows you exactly how the camera works.

Front Magazine

Rear Magazine



The front of the magazine holds the unexposed film, which is carried down into the camera by sprocket wheels. Metal claws pull the film into place behind the lens; and as each frame pauses at the aperture for $\frac{1}{50}$ second, it is exposed to the light entering the lens.

All film is coated with a special emulsion that is sensitive to light. You yourself are able to see things only because they reflect light. That is why you can't see anything in a pitch-black room. Dark things reflect very little light, and bright things reflect a great deal, and this reflected light is what you see.

The emulsion on film "sees" light just as your eyes do, but it has the added power of recording it permanently.

The light coming through the lens is an exact reflection of all the light and shadows in the scene before it. These different shades of light coming through the lens focus on the film and are recorded exactly by the emulsion. Each frame of a moving picture really is a picture painted in light.

After the frame has been exposed, the shutter clicks closed and then opens again when the next frame is pulled into place. This happens 1,440 times a minute. The exposed film runs off to another part of the film magazine.

The motor, the whirring of wheels in the camera, and the clicking of the shutter don't make very much noise, but they can make enough to spoil the sound track. Therefore,

THE CAMERAMAN AND THE CAMERA

the whole camera is fitted inside a soundproof metal box called the "blimp" or "bungalow."

The blimp rests on a special tripod head called a *geared head*. The geared head is controlled by two wheels. One moves the whole blimp up or down, and the other moves it sideways. If there were the least vibration in these movements, by the time you saw the picture magnified, it would jump so much that you would have a hard time seeing it.

The camera is mounted on a heavy little wheeled truck called the "dolly." The camera on its dolly never goes anywhere by itself. The dolly always runs on rails like a trolley car. If the script calls for the camera to move into or away from a shot, the rails are always laid first. Then the camera will travel smoothly along the right path. The dolly and the camera together weigh hundreds of pounds.

If the camera is to take a shot from overhead, it is taken off the dolly and mounted on a huge metal boom. The boom is like the crane on a derrick. At the top is a platform for the camera, the director, the cameraman, and his assistant, who does the focusing. Changing focus as the boom or the subjects move is called "follow-focus."

This camera boom is mounted on its own dolly, and it takes four men to push it. Another man stands on the dolly and works the lever that swings the whole boom up or down or sideways. Still another perches on the rig-





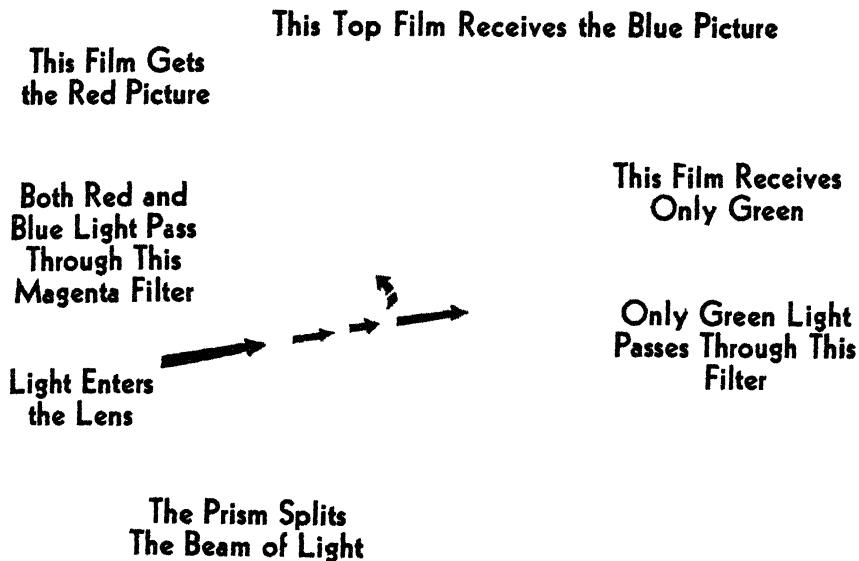
ging or on a special scaffold and acts as a traffic cop.

The cameraman has a number of special lenses to help him when he wants to get special effects. There is a lens that will stretch perspective so that distances seem longer. And there is another that will make distances appear shorter. There is a lens like a telescope that will make faraway things seem large and near. There is another lens that will take a scene so big that you would have to turn your head to see it all. Perhaps the most-spectacular of all is the "zoom" lens. When the cameraman wants to dolly in but conditions on the set do not permit it, he uses the zoom lens, which, when cranked, makes it appear as if the camera were zooming into or out of the scene. The zoom lens is not used to replace dolly shots because what it does is magnify the scene, and this makes a very grainy picture on the screen.

THE CAMERAMAN AND THE CAMERA

The camera used to make our present color movies is quite different from the camera that takes black and white pictures. Instead of using a single strip of film, the Technicolor camera uses three.

There is just one lens in the Technicolor camera, but right behind the lens is a prism that splits the beam of light coming in, into three parts.



All color is just a reflection of light of different wave lengths. Violet light waves are very short, for instance, and red waves are much longer. When your eyes see different colors, they are tuned to the wave lengths of those colors, just as your radio set can be tuned to the kind of radio waves a particular station sends out.

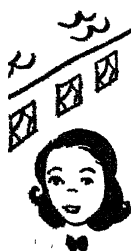
Some kinds of film are tuned to catch all wave lengths of color. But the Technicolor camera does not use these color films. With the help of the prism and the filters, it splits the light into three primary colors. Each of these colors is recorded—in its corresponding tones of black, gray, and white—on a separate film.

Different parts of the picture are being taken on three strips of film at one time, so it is terribly important that these films are always "in register"—that they are all taking the same thing at the same instant. If one of these films were even a thousandth of a second behind the others, the picture you finally see on the screen would not be clear.

The drawing will show you what happens when a picture is "out of register." The black should be exactly on top of the gray, but because it is a little off, the whole picture is not quite right. You can see this even better in the funny papers when the colors do not come together the way they should.

Even after it leaves the camera, the film that is going to be a Technicolor movie is never allowed to get hot or damp or exposed in any way that might make it stretch or shrink the least bit.

After it is developed, each strip of film is printed separately by the printing machine as a regular black and white negative, and then a strip of colored film is made exactly like it,



THE CAMERAMAN AND THE CAMERA

to correspond to the color that reached it through its filter in the camera.

One is made in red.

One is made in blue-green.

One is made in yellow.

These are the three primary colors of which all other colors are made.

Each of these strips, which is called a *matrix*, is pressed in turn by another machine against a blank film, and thus the colored dye is transferred to that film. By the time the three colors have been pressed onto this blank film, a complete print has been made. All the shades and tints of these colors combined make the Technicolor pictures you see on the screen. Black, of course, is all three colors together.

Making a Technicolor print isn't so complicated as it sounds. Colored pictures in books and magazines are printed in the same way.

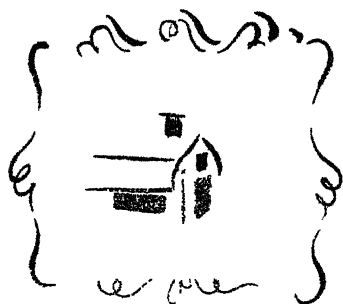
Aside from the camera and printing, there aren't many differences between the making of a Technicolor movie and a black and white one. A separate color script is prepared for each scene. If it is a sad scene, dark, gloomy colors are used; if it is a jolly scene, the colors are bright and gay. It is easier to light a scene that will be shot in color because different colors stand out more clearly against one another than the shades of gray that make up a black and white movie.

When they are planning a color movie, the director, the head cameraman, and the de-

THE FILM MAGAZINES
OF THE TECHNICOLOR
CAMERA ARE EXTRA
WIDE TO HOLD THREE
ROLLS OF FILM
AT ONCE

THE CAMERAMAN AND THE CAMERA

signers make sure that colors which are unpleasant together never come near one another in the picture. That is why you sometimes wonder at things looking more beautiful in a color movie than they do in real life.



CAMERA TRICKS

Almost all camera tricks are made in the *camera effects department*. They are done with combinations of cameras, but not on the stage with the camera that is shooting the picture.

The most everyday tricks are fades and dissolves, and one or the other comes between almost every change of sequence in a picture. A fade-in starts with the screen dark, with the picture gradually appearing until you see it clearly. In a fade-out, the picture gradually fades into darkness. In a dissolve, one scene seems to merge into the following one.

Fades and dissolves are done on an *optical printer*, a camera that rephotographs the scene and then adds the effect. For a fade, the shutter is opened or closed. A dissolve is really a double exposure. The end of one shot is exposed; then the film is wound back and the beginning of the following shot taken right over it. When Melies's bus turned slowly into a hearse, that was a dissolve.

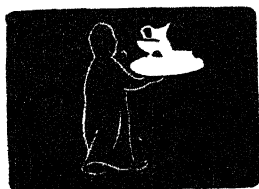
The double exposure is used for a great many movie tricks. Whenever you see a ghost in a picture, you can be pretty sure that it's a double exposure. First the scene is taken with real people in it, acting as if they were seeing a ghost. Then footage is taken with nothing in the scene but the ghost against a solid black background. Chalkmarks on the floor tell the ghost where the people and furniture stood in



THE CAMERAMAN AND THE CAMERA

the first take, so he won't look as if he were walking through them in the final picture.

Black comes out perfectly clear on the negative of movie film just as it does on a snapshot negative. So when the footage with the ghost on it is put on top of the first take, the ghost looks as if he were right in that scene. And since you can see through the developed film, you can see through the ghost to the scene behind him. The optical printer combines these two strips of film into a single film.



Glasses of water or trays of food that fly around with no one touching them, and feet or hands, or heads with no bodies, are all made by double printing. Someone completely dressed and masked in black carries the tray against a black background or perhaps walks around with only his head uncovered. These scenes are printed over the background takes in the optical printer.

When you see people jumping backward up out of the water onto a diving board or skiing fast and backward up a hill, they were taken doing those things the right way, only the camera was upside down. In the printer, the

THE CAMERAMAN AND THE CAMERA

last frame is printed first, following the last frame of the preceding sequence. In other words, the scene is spliced in backwards. The part that was taken last—of the diver hitting the water, for instance—is what you see first. If the camera weren't held upside down, the wrong side of the film would be up after it is reversed.

No magician ever had a better assistant than the camera mask. The mask is a sort of shutter that can be placed behind the lens and in front of the aperture. The film behind the mask stays unexposed.

When one actor takes two parts in a movie, the mask helps out. First the scene is taken with the actor playing one part on one side of the frame, and then it is taken with him playing his other self on the other side. In the optical printer, the first scene is rephotographed with a mask covering the empty side of the frame. Then the film is wound back, and the second scene is taken, with the mask covering the exposed part. Now the actor and himself are on the same film. In a scene like this, it is important that the edges of the two halves match perfectly. If the special-effects man working the printer makes a mistake, he just does it over. Mistakes on the set itself waste the time of the whole company.

Have you ever seen a fat man step behind a thin lamp post and disappear? A mask!

MASK



Or a horse and buggy drive behind a tree and come out the other side a streamlined automobile? A mask!

The movies play a whole bagful of tricks on you without using the optical printer. A couple of these are real camera tricks.

Slow-motion pictures are made by running the film through the camera at a very high rate of speed. This won't sound so funny if you think about it for a moment. The camera usually takes 24 pictures a second, and that is the number you see on the screen. Suppose it is a picture of a second baseman hitting the ball, and it takes just 24 pictures to show him swinging the bat all the way around. Now suppose the camera is speeded up until it takes 40 pictures in that second, but when it is shown on the screen, you still see 24. By the time that second is past, the player has only swung his bat part way around because he still has 16 frames to go before he completes the action. Thus he appears to be moving slowly.

Sometimes you see pictures of a plant growing from a seedling to a full-sized flower in a few seconds, or a skyscraper growing just as quickly from a yawning hole in the ground. This is done by taking a few frames at a time—perhaps once a day—from exactly the same spot and angle. It is called a *time lapse*. When the film is finally all run off together, the flower or the building grows before your eyes.

THE CAMERAMAN AND THE CAMERA

We talked about the process screen in Reel Four. That's a handy movie trick by which an actor can look as if he's anywhere in the world. He can stand up to his ankles in a few bucketsful of sand and look across the desert to the Sphinx, or he can hang from a little ledge of bricks with his feet just a few inches from the floor and look as if he's about to fall off one of the tallest buildings in New York.

Many movie tricks are done with models but they don't look like tricks at all. Models used in the movies are masterpieces. Skilled craftsmen sometimes work for months on them. They build towns and cities, islands and ships that you can't tell from the real ones. Whenever something in a movie blows up or burns down, you can be pretty sure that it's a model. Big sets are costly and hard to replace and directors don't go around blowing them up to make a two-minute scene exciting. The same is true of airplanes and battleships.

Real sets and models are usually combined so skillfully that you can't tell where one stops and the other starts. A great full-rigged ship is likely to be a model, with a real set built

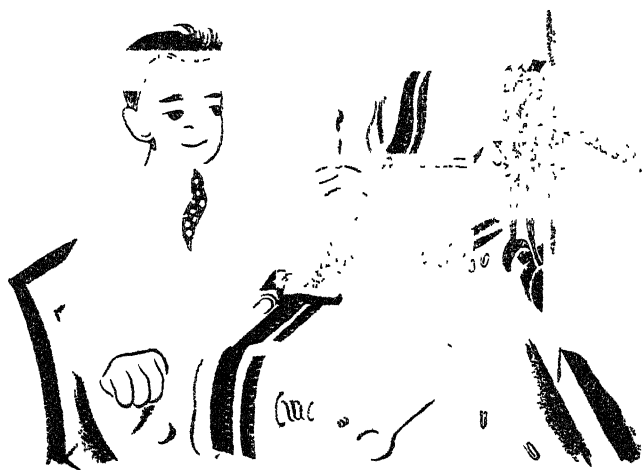


exactly like one part of her deck.

you see the whole ship you are seeing the model; the scenes with the actors on deck were taken on the big set.

When models were first used, there was quite a problem about taking long shots of the little ships bobbing on the waves of the tank. A real ship rolls slowly in a rough sea, but a model ship bobs up and down fast on the waves of the tank like any toy boat in water. But the movie makers always find a way. They take their pictures of the model ship in slow motion.

In the movies, you can't believe everything you see.



Reel Ten

EDITING AND PROCESSING

THE editor's life is not an easy one. During the shooting of the picture, he is deluged with 100,000 to 150,000 feet of film. He must cut this down and sort it out until he has made a picture of about 7,000 feet.

There will probably be four or five hundred different shots in an average movie, and the poor editor may have to look at ten takes of each one.

Every day after the shooting is over, all the takes from all the pictures in production are hurried to the lab and developed and printed in a great rush. Every morning before the shooting starts, the director and his assistants, the stars, the cameraman, and the producers look at these "rushes." The whole group of rushes from all the pictures in production are called the "dailies."

If most of the people working on a picture

think the rushes are poor, the whole scene has to be shot over again. Usually, though, there are a few takes that are just what everybody had in mind. Then the director and producer breathe a sigh of relief and get on with the next scene. Every time scenes have to be re-shot, the picture gets farther behind in its schedule, and the budget for the picture goes up and up.

After the rushes have been okayed, the selected shots go to the cutting room, and the film editor, who has studied the script carefully, picks out the best ones.

The cutting room looks a mess. There is film everywhere: piled in bins like spaghetti, in baskets and boxes, and on rolls in racks. But every bit of this film is labeled and listed; the editor can put his hands on any take of the shortest scene at a moment's notice.

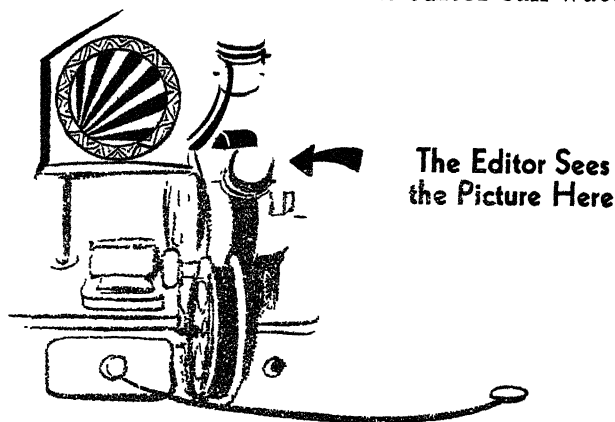
Every day after the director calls, "Wrap it up," the script girl sends a copy of the records to the editor, with the number, the footage, and the dialogue of every shot. These records are filed in the cutting room.

After each sequence of the picture is finished (a sequence is a part that tells its own story, like an act in a play), the editor makes a "rough cut" of all the scenes in that sequence. He studies the script carefully to get the feel of the sequence and its importance to the plot. Then he goes over all the takes that

belong to that sequence and picks out the ones which he thinks tell the story best.

As he goes along, he fits sequences together until he has a rough cut of the whole picture.

The editor's worktable has winders for the reels of film, filing racks for small rolls, a splicer for cementing the shots together, and clips for holding the film together until it is spliced. But the most important thing is a machine called the *moviola*. The editor can watch



the film running through the moviola just the way he would see it on a full-sized screen. At the same time he can listen to the sound through earphones.

While the editor is cutting the film, the sound editor has to cut the sound track to match—the match must be perfect.

So the first thing the editor does is match the action to the sound. He looks at the beginning of the take for the picture of the assistant cameraman holding the clapper and slate. If the slate says, "Scene 32, take 1," he





matches it to the sound track from which the assistant cameraman's voice says, "Scene 32, take 1." The editor runs the action film through the moviola until he comes to the exact spot where the two halves of the clapper bang together. Then he matches that to the sharp mark that the clapper made on the sound track.

All the editor has to do is match the picture of the clapper banging and the sound it made. Then he puts the sound and action films exactly together on the moviola. After the picture and the sound track are put in "sync," they are marked with a crayon and then both are "coded." This means that the same numbers are printed on every foot or so of both the sound track and the action film.

The editor has at least three or four and usually more sound tracks to juggle along with the action. These are all finally played off, each in the right place, into a re-recording machine and recorded on a single track.

Cutting is one of the most important steps in movie making. A poor cutting job can ruin the best picture, while a really good cutting job can make a movie seem better than it is. Working with the director, the cutter must take all the hundreds of shots the director has given him and put the best of these together in the most exciting way possible.

It is like having a huge pile of bricks, metal, and lumber out of which to build a house. A

good builder knows how he wants the house to look when it is finished and he uses the available materials to make it as nearly perfect as possible. He doesn't feel as if he must use all the material just because it's there. If the house looks better with one chimney he doesn't give it three simply because there are enough bricks. He only uses the ones that are perfect.

Because the editor has to discard about fifteen feet of film for every foot he uses, he often hurts people's feelings. Sometimes an actor's whole part will be cut out. A set that took weeks to plan and build may never appear in the picture because that particular scene slows down the action too much. Sometimes a scene that a star feels is her best will be cut right out. The director and the producer work with the editor and they all take the blame together. But they stand firm.

An editor has several tricks that can make a scene or a sequence more exciting. One of these, double cutting, we talked about back in Reel Two. Double cutting is cutting back and forth between shots or scenes of two actions to build up suspense. It is generally used when one of the leading characters is in trouble and help is on the way. The excitement keeps building up until the two actions meet in the climax of the picture.

Parallel action is something like double cutting, but it doesn't happen so fast. Two separated actions are taking place, but you may



see whole sequences of each one before they come together.

Montage, on the other hand, is much faster than double cutting. Montage was another one of D. W. Griffith's ideas.

The editor uses montage when he wants to give you an impression of things happening all at once. In a montage, shots are cut very fast or dissolved into one another so that they are seen in rapid succession. If the editor had a very short time in which to show a raging battle, he would probably use a montage of soldiers' faces taken from all angles, of cannon flashes, of flags and guns and wreckage. A montage is built to give you a full picture impression in a very few seconds.

The director and the editor try, as much as possible, to let you see things from the actors' viewpoints. When you are watching a really good movie, you usually put yourself in the place of one of the leading characters. The director and the editor try to make *you* feel the things that are happening to him, try to make you laugh when he does and feel frightened when he is. If he is walking in the woods at night, you see the things he is seeing—the big black shapes of trees, the mysterious shadows, and the branches of the underbrush reaching out for him—and you.

After the first complete rough cut is made, the producer, the director, the stars, and the other key members of the company come to



see it and make suggestions about the final cut. After the final cut is made, the picture is tried out before a real audience at a "sneak preview."

The sneak preview is just what it sounds like. The audience of a neighborhood theater will go to the movies one night to see the picture that is billed there. Then, when that picture is over, a notice flashes on the screen saying, "This is a preview." And there it is, our brand-new picture.

The producer, the director, their assistants, and sometimes the stars are in the audience, too, making notes a mile a minute.

Then, when the picture is over, the audience is asked to drop criticisms and suggestions into a sort of ballot box as they file out.

After the sneak preview, the director and producer may feel that it is important to make some changes in the picture. Perhaps they noticed that the audience laughed so hard during some parts of the picture that important lines were drowned out. They will have to cut in a shot there to allow time for the laughing to die down. Perhaps the audience got restless during one sequence. It will have to be shortened. Perhaps the audience did not like one of the actors. His part might be cut down.

This is the time when the careful filing of the editor comes in handy. One of the most unimportant little shots that he has labeled, tucked away and forgotten may be exactly the

THIS IS
A
PREVIEW



thing to save hours of additional shooting.

The print that has been used up to this time is called the *work print*. It is a collection of shots, scenes, and sequences spliced together into a picture. The master negative and prints are made from this work print after it has been corrected.

Several hundred copies (the number is limited to three hundred in wartime) are made of the picture and stored in big fireproof, air-conditioned vaults. These copies are made like this.

After the film made from the work print is taken from the camera, it is developed just the way snapshot film is, except that it is run on a sort of assembly line. There is so much film to develop that it would never get done if it did not run continuously.

First it is run through a tank of developer which washes layers of the light-sensitive emulsion off the film until the picture gradually appears. This coating is of specially prepared silver. There is so much silver at the bottom of the developing tank at the end of each day that the studio may sell it.

What the developer does is to change the special silver and gelatin coating on the film into the real silver that forms the picture on a photographic negative. A negative is just the reverse of a positive print. Where a lot of light hits the emulsion on the film, the silver sticks fast. Where less light hits the film, some of the

silver washes away. Where no light hits it, all of the silver washes away, leaving only the clear film base.

If you look at a snapshot negative, you will see that it is the reverse of the way the final print will look. Things that will be black on the print are clear. Things that are going to be light are quite dark or opaque.

The negative keeps on going. Next it passes through a tank of water that washes off the developer and hardens the emulsion. If the developer were left on the film, it would keep developing it, and the film would get darker and darker. This, of course, would make the final print too light. Sometimes film is underdeveloped on purpose, so that the final scene will look darker and gloomier than it is. Film that is overdeveloped is said to be "cooked."

After this, the film runs on through a tank of hypo, which is a kind of acid almost exactly like vinegar. The hypo washes off the remains of the unexposed silver and clears the backing from the film. This backing has kept the light from getting through to the emulsion from the wrong side. Finally the hypo "fixes" the picture just as it is. All that remains is a pure silver image on the clear film base.

Now the film travels through a final wash. The developer, the hypo, and the washes are all kept at the same temperature because sharp changes would make the image on the negative slip every which way. Then the pictures



**A NEGATIVE LOOKS
LIKE THIS**

would be distorted like a scene in a crazy mirror. This is called *reticulation*. Sometimes the lab men use reticulation on purpose to get 'trick effects.

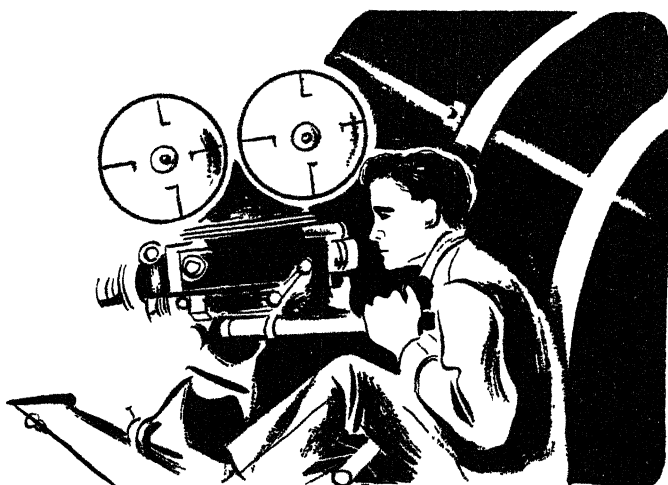
After the negative is washed, it moves on rollers through the "dry box."

The final positive prints are made from duplicate negatives in a printing machine called the contact printer. The negative is pressed against an unexposed film, and a light shines through it onto that film. Where the negative is clear, much light shines through and makes dark areas. Where there is a dark or opaque image on the negative, very little light comes through and those areas are light.

This positive print is the one that is used in the projector of your theater.

Now the positive print follows the same path that the negative did through the developing tanks.

When film is in the developing tanks it is "in the soup." And when the picture is all finished and safely stored away, everyone breathes a sigh of relief and says, "It's in the can."



Reel Eleven

THE NEWSREEL
MAKERS AND
THE ARMY
AND NAVY
CAMERAMEN

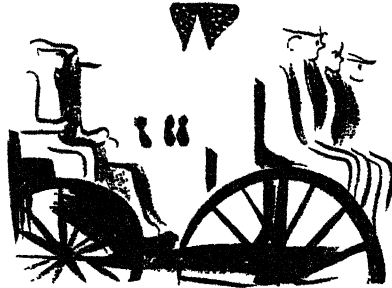
THE NEWSREEL MAKERS

WITH all parts of the world getting closer together all the time, things that happen in its farthest corners are important to every one of us.

During a war, with people you know fighting on every battle front, you are eager to see pictures of those battles so that you can feel a little of what is happening there. If a country gets a new leader, you want to see what he looks like and hear him talk and watch the faces of the people around him. This man may become a great power in the world, so you want to know something about him. If a hurricane smashes into the coast of Florida, destroying towns and crops, you want to see that, too. A man may hit the longest home run or invent a new kind of airplane. It's the job of the newsreel men to see that you are there.

THE NEWSREEL MAKERS

The first movies were all newsreels because as soon as men could take pictures they wanted to record the world around them. People flocked to see great events happen before their eyes. One of the first movies was a newsreel of the inauguration of President McKinley in 1897.



Unfortunately, the movie companies didn't have very strong consciences about their newsreels. One breath-taking scene of a volcano erupting later turned out to be a beer barrel exploding in the sun. While a few newsreels of the Spanish-American War were authentic, most of them were fakes, staged and taken in New Jersey instead of Cuba. The newsreel company didn't really think it mattered as long as people got an idea of what was going on. Besides, cameras were scarce and couldn't be risked; and if the newsreel men went near a real battle, they might get hurt.



PATHE NEWS
CAMERA, 1912

Nowadays we take it for granted that our newsreel men go into all kinds of danger to get their pictures. It is their business to be on the spot when things start to happen.

Five big companies make the newsreels. These companies have about three hundred

THE NEWSREEL MAKERS

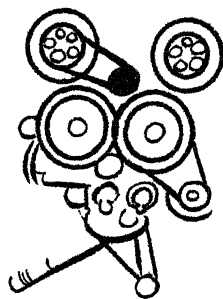
units scattered around the world. These units usually stay in key places, such as the capitals of the countries where events are most likely to happen. They always keep their ears to the ground for rumors of news. The companies have lookouts, too, who are always on the alert. Everybody works for one thing—to get the unit to the scene of action as quickly as possible, to get the pictures, and to rush them home and into your theater. Since it is often impossible to get to the scene before the action is over, many newsreels are really feature stories on the news.

A unit is made up of a cameraman, his assistant, a sound engineer, and all their equipment. The newsreel camera is lighter and simpler than a studio camera because it must be easy to move and to handle and ready to be taken anywhere at a moment's notice. It may have to be taken on a train, a plane, and up the side of a mountain in one day. The cameraman may have to carry it into battle with the infantry or to pick it up and run for his life in the middle of a flood.

The sound equipment is simple, too. The sound man must be able to move his equipment in just as much of a hurry as the cameraman. The sound track is usually dubbed in with the commentary after the newsreel has been edited and the different subjects that make it up are combined. If the sound is recorded during the action, a single-system



NEWSREEL CAMERAS



sound camera is used—that is, a camera that makes the sound track on the same film with the picture. Most of the apparatus is in the camera. This sound track is re-recorded on another piece of film for cutting purposes.

Once in a while the newsreel companies will buy a picture from an independent cameraman who has had the good luck to be at the right place at the right time with his camera, but usually the nearest unit manages to get to the scene as fast as anyone else can.

Often the weather is against them. It may be raining heavily, and the rain gets on the lens and blurs the picture. Or the story may be happening at night where there is no light in which to take the picture. Newsreel men in the tropics have to keep their film in special packs so it won't start to melt or get mildewed. The weather may be so bitterly cold that parts of the camera freeze in position and refuse to budge. Sand or salt may get into the delicate gears and jam them. The newsreel men may be working against any of these troubles, but they usually get their pictures.

The next worry is getting them back the fastest way possible to be developed and distributed. A newsreel is not like the feature pictures the movie companies make and store until they are ready to market. A newsreel is news, and nothing stays news very long. Unless it is in your local theaters before something else comes along to replace it in your



interest, it's as stale as last month's newspaper.

Of course the newsreel men don't just sit around and wait for news to happen. They keep pretty busy in between big news events. They take stock and reference shots of famous people and places, and their companies keep all this film on file. Then, suppose one of those famous buildings is destroyed and no newsreel man gets to the spot on time. The company can take out its stock shots and show you pictures of the building being constructed or painted, or of the things that occurred there. It isn't exactly news but it's a sidelight on the news that helps you feel closer to what has happened.

In addition to straight news the newsreel men take "human interest" pictures of all the ordinary little things everybody enjoys seeing. They cover beauty contests, the crowning of the queen of the apple blossoms, and the feeding time at the zoo.

Of course they take all of the routine news that everybody knows is going to happen—sporting events, ship launchings, speeches, and parades.

The company edits all of these things into a weekly newsreel that is from 800 to 1,000 feet long and that costs between \$13,000 and \$16,000 to produce. While you're sitting in the theater watching it, the newsreel men are wandering through the world looking for next week's program.



THE ARMY AND NAVY CAMERAMEN

During a war, no cameramen anywhere are as important as those of the Army and Navy. Sometimes you see some of their pictures in the newsreel and the commentator says, "These are official Army Air Forces [or Signal Corps or Navy] pictures." These pictures are the smallest fraction of the work these cameramen do. Most of their work you never see at all.

The combat cameramen of the Army and Navy are everywhere on every front. They move in with the invasion troops; they hit the beaches with the Marines; they land in gliders; and they sail on aircraft carriers. They hack their way through jungles with engineers who are building a road, and they work in hospital tents where doctors are operating.

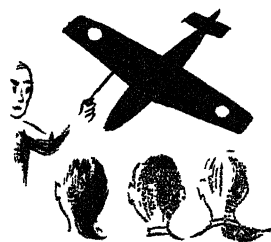
The pictures they take are news, but there are other more important uses for them. By studying the pictures of an amphibious landing, for instance, the War Department can learn a number of important things. How well suited for this operation is the particular equipment we used? Can it be improved upon? Perhaps a slightly different kind of track would keep the tanks from sinking so deeply in the sand. Does our fire pattern give the men the best possible protection? Did our bombardment daze the enemy? Look at their faces.

Studying hundreds and hundreds of these



films the War Department can compare the performance of our weapons with that of our enemy's and can see where they are most vulnerable. They can check up on our bombing methods. A still photograph will show whether the target was hit or not, but a cameraman in another plane, by taking a picture of the whole operation, can find out why. Did the bombers start their run too soon or too late?

They can check up on the enemy's fighting technique. Are their pilots trained to come in, in a particular way? We'll take advantage of that. What are the weak points of his planes? Of his tanks? We'll train our fighters to take advantage of them.



A doctor in a hospital tent in the South Pacific may perform a remarkable operation. All over the world, other Army and Navy doctors can study his technique from a movie film of it and save hundreds of lives in similar operations.

How did the engineers who built the Ledo Road meet the problems of swamp and jungle, and how is the road holding up?

How do the infantrymen look after three days in the line? Should they be relieved or can they stay in four days?

Is there too much strain on the ropes between the tow planes and the gliders? They look pretty frayed.

The experts in our War Department don't have to run all over the world to see these

things, and they don't have to take anybody's word for them. They can see for themselves right where they are. They can look into every front at once through the camera's eye.

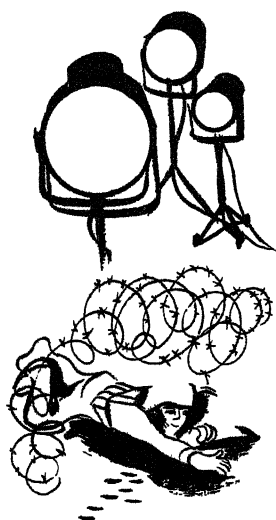
The experts aren't the only people who see these pictures. The men who are going to live and fight in those places see them, too, as do other soldiers fighting in different theaters of war. The factory workers see them and how the machines and equipment they are turning out are being used in battle.

Other Army and Navy cameramen, working at studios in this country, make hundreds of pictures of a different kind. The War Department has learned that it can teach men important things faster with movies than in any other way.

Movies have been used to teach millions of men how to take care of their rifles and why it is important to keep them in perfect shape. Movies have been used to teach small groups of men how to use some complicated secret piece of equipment.

There are movies about everything a man will use and do in the Army or Navy. With their aid, men can learn how to crawl through barbed wire, how to fight barehanded after they have lost their weapons, how to take care of their health, and what will happen to them if they don't learn any of these things.

These pictures are all made as clear and interesting as possible so that everybody will pay



THE ARMY AND NAVY CAMERAMEN

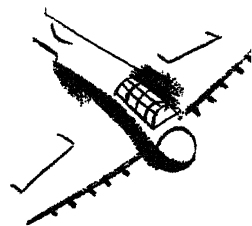
attention every minute. A soldier's life may depend upon something he didn't see in one of those pictures because his mind wandered to something else. The Army and Navy film units have to make pictures that will hold the attention of their audience throughout every foot. This is a challenge that no other movie makers in the world must face.

To help them to do their jobs under battle conditions, the combat cameramen have all sorts of odds and ends of special equipment, many of which they've worked out themselves. They have had to figure out ways to keep their cameras from getting ruined, places to which they could fasten them to get the best pictures, ways to avoid the terrific bumps and bangs, and ways to keep the pictures in focus.

Automatic cameras are good assistant cameramen. They are some of the best intelligence getters the War Department has. They never black out, lose count, or forget anything.

A good deal of the combat film is developed before it is sent on, and in some theaters of war this is quite a problem. Sometimes in the tropics the developing solutions get as hot as a hundred and twenty degrees.

Working against handicaps that are any movie maker's nightmare, the Army and Navy cameramen get the pictures that help win wars.



FIGHTERS HAVE
CAMERAS IN THE
WINGS THAT WORK
WITH THE GUNS



Reel Twelve

DOCUMENTARY
AND
EDUCATIONAL
FILMS

THERE are very important kinds of movies that are neither news nor really just entertainment. Among these are the documentary films.

Documentary films are a record of life in our times. Not all of it at once, but of little groups of people and the way they live. There is nothing make-believe about a documentary film; you see the people as they are, living the way they really live. You are shown their particular problems and the good and bad of their daily lives. Documentaries help you to know of groups of people you might never meet and of ways of life different from your own.

A documentary film has no plot like an ordinary movie but it has a theme, just like a piece of music. Running through the picture will be an idea that the producer wants you to get; a point of view he wants you to see and feel. A good documentary is a propaganda

picture. The producer is fighting for something.

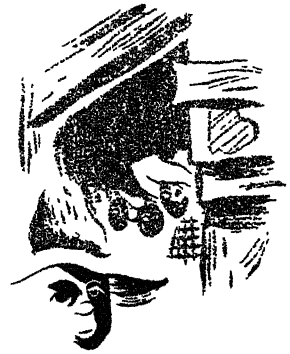
Perhaps the film is about a group of colored sharecroppers in the South. By showing you carefully and painstakingly what it means to be that poor—the tumble-down houses, the shabby clothes, and weary faces—the producer makes you feel in the beginning that you wouldn't like to live that way, and makes you feel in the end that nobody should have to live that way.

The producer might make you realize how much the peasants in Mexico need proper medicine, how hard the farmers on the western plains work, or that something should be done about the slums of a big city.

The documentary makers have an important job. They try to make you know and understand your fellow man. They try to show you that he has the same feelings and the same problems and to make you put yourself in his shoes.

The producer of documentary films has some of the same jobs that a Hollywood producer has. He is the business man of the company. He has charge of the money, and he decides what pictures are to be made and how each is to be treated. The producer chooses the director and the other important members of the unit that is going to make the picture.

Because the picture is the presentation of a point of view, it is very important that the



producer and the director see eye to eye on it and that the director is interested in the subject and sympathetic to the idea the producer wants to put across.

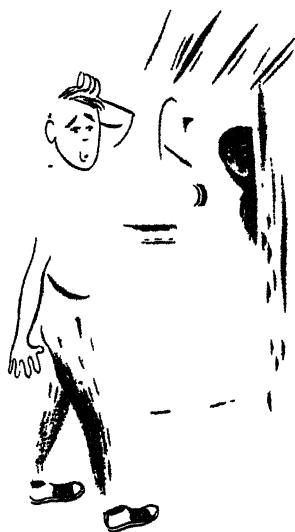
The director and his crew of technicians set up shop right among the people they are going to film. They live with them, study them, and try to understand their problems and their way of life. A good documentary doesn't try to make this way of life more exciting or dramatic than it is. Its aim is to give you a true picture.

There are no stars, sets, costumes, or props in a documentary because it is an exact record with nothing added. This means that the responsibility the cameraman carries is very heavy. He must get exciting and beautiful pictures in places that were never built for taking pictures at all, and which usually weren't built for beauty.

He must manage good lighting without elaborate rigging, and good camera angles without being able to take pieces out of the wall, as he can in the studio.

In a newsreel these things are true, too, but they aren't really important because the purpose of the newsreel is to bring you news. But the documentary is telling a true story in pictures, and the pictures must be good.

Another difficulty in making a documentary is in getting people to act just as they always do in front of the unfamiliar lights and



cameras. You know how self-conscious you feel when someone is taking a snapshot. Well, imagine trying to do all the things you usually do every day with a motion-picture camera watching every move.

The director has to make friends with the people he is filming and must have the ability to put them at ease in front of the camera. If they don't like him, he may just as well pack up the unit and go home. Sometimes the producer will change directors in the middle of a picture for this very reason. In making regular movies, everyone is doing a job, and it doesn't much matter whether the cast likes the director or not.



The editing of a documentary is very important. It is up to the editor, the producer, and the director to cut a number of everyday things, some of them unpleasant, into a movie that will keep you interested, teach you something, and make you think.

During a war, the government is the biggest producer of documentary films. It is vital that the people of a country at war have a reason for fighting, that they know what they are trying to do and why, that they understand their allies, and that they know their enemy.

So the governments of countries at war make movies about all these things. You can see how war affects the grocer, the war plant worker, the soldiers, and the people of your

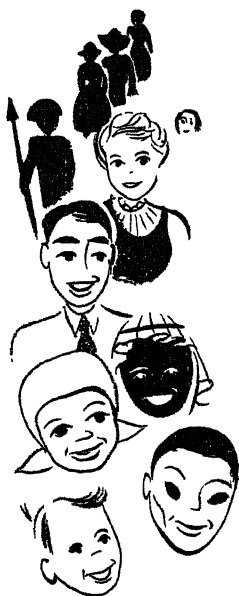
town. You can see how it affects the daily lives of your allies, and what they are doing to win. You can see the enemy at close quarters and what has happened to the people he has conquered.

After a war, moving pictures have another tremendously important use. Documentary movies are used in defeated countries to show them what life in democratic nations is like and to make them want that kind of life enough to cooperate and to work for it. Movies are used, too, to teach them what is expected of them in their new way of life.

An exchange of documentary films among the nations of the world, showing the common interests of their peoples and the progress made in handling their common problems, will be an important step toward the mutual understanding that is necessary for a lasting peace.

Documentary and educational pictures run so easily into one another that it is hard to tell where one stops and the other starts. Educational pictures are documentary in their own way because they present facts, but they are not always about people.

Educational pictures are moving records of things we have learned about the world. An educational picture can show you clearly, in a few minutes, things that might take a teacher hours to explain or that might take you days to get out of a book. It is easier for many peo-



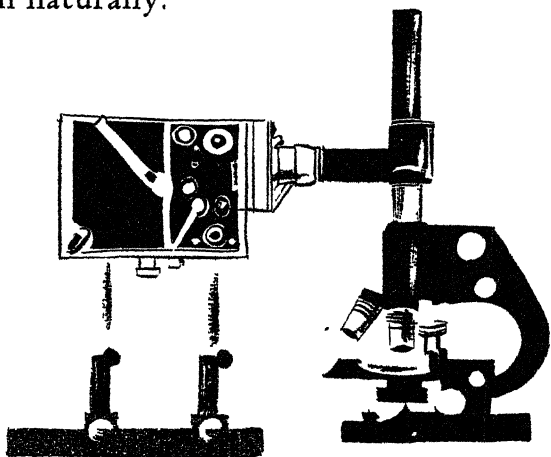
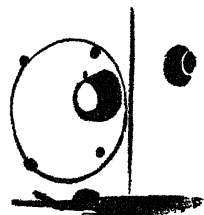
DOCUMENTARY AND EDUCATIONAL FILMS

ple to learn things from a picture than it is from a teacher or a book for this reason: they actually see the things happen before their eyes.

Makers of educational movies gather things into a picture that might take you months or years to see for yourself even if you were to spend all your time looking.

Scientific cameras make use of many camera tricks. With stroboscopic cameras, the shutters of which can catch a picture in $\frac{1}{1,000,000}$ second, you can see things that happen much too fast for the human eye itself to catch. With slow motion, you can have plenty of time to study them. Using the time lapse we talked about before, you can watch in a few minutes what has taken months to film naturally.

A HIGH SPEED CAMERA



Cameras hitched onto microscopes show you things much too small for you to see alone, for instance, germs in a drop of water.

DOCUMENTARY AND EDUCATIONAL FILMS

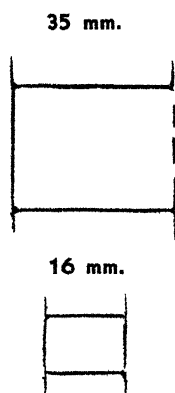
A picture combining time lapse with X ray can take you right inside of an eggshell and show you an egg turning into a baby chicken.

Other educational pictures teach the workers in factories ways of doing things—just as they were used in teaching the soldiers. Because it is more interesting to watch a movie than it is to listen to someone talking, people learn faster from movies than from a lecture. They can be shown details, too. A complicated little part of a machine can be enlarged hundreds of times.

Most educational films help you to know your world better than you did before. You can see how a big railroad runs and works, or you can see how a beaver cuts down a tree. You can watch native dances halfway around the world or the way your milk company pasteurizes its milk.

Other films are used for research, by doctors and scientists, by industrialists, and by the government. They can study microbes, machines, the soil, and thousands of other things.

Most of these educational and research films are made by special companies who don't do any other kind of work. Instead of being $\frac{5}{8}$ by $\frac{7}{8}$ inch, or 35 millimeter (you usually see this abbreviated to "mm.") the pictures are photographed in 16 mm. This smaller size film has several advantages. The camera is less bulky. Smaller and less expensive projectors



DOCUMENTARY AND EDUCATIONAL FILMS

can be used, which almost every school, library, and factory can afford. There is no reason for the picture being larger anyway, because educational films are usually seen by smaller audiences than Hollywood films.

Another advantage is that pictures can be shot directly in color on a single film without the complications of the three-film Technicolor method. There are 16-mm. color films that are sensitive to all colors.

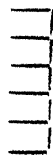
Most of the sound in an educational movie is postrecorded, or dubbed in after the picture has been completely finished. A great many of them are silent because a speaker goes along with the picture to explain or answer questions. Sometimes, too, the picture itself, with a few titles, tells all there is to tell.

If you have a movie camera at home (yours is probably 8-mm.), you can make documentary or educational pictures yourself. The documentary might be about your family or the people on your block, and there are a hundred subjects around you for an educational.

Here are some things to remember. After you've decided on your subject, prepare a shooting schedule that will divide most of your footage among the things you think are important and will leave less for the others. After you've decided what your important things are going to be, stick to them.

Be sure to get variety in your shots. Have some long shots and some close-ups. And don't

8 mm.



forget to work for interesting camera angles.

Be sure to take some little shots that can be used to hitch other scenes together. They will make your story more fun. For instance, a shot of the paper boy to show that it's morning or of the family sniffing the cake while it is in the oven.

When the film comes back, don't be afraid to edit it. If you haven't got a film splicer, sharp scissors, some film cement, and a flatiron will do nicely. Just be sure to match the sprocket holes at the edge of the film and to leave the flatiron—cold, of course—on the splice until the cement is quite dry. A good editing job will make your picture better.





Reel Thirteen
**THE ANIMATED
CARTOON**

NOTHING is impossible in an animated cartoon. In filming real things the movie makers have a big bag of tricks, but there are some things they just can't do. The cartoon makers are limited not by what the camera sees but by what they can draw, and they can draw anything.

If they want an airplane to flap its wings like a bird—that's easy! A wolf in a top hat can blow a house down; a hen can sing an opera; and a chorus of daisies and bumblebees can do a ballet.

A tremendous amount of work goes into making any of these things before you see it on the screen. It takes thousands of drawings to make even a short cartoon and actually millions to make a feature-length one.

The pictures in a cartoon move for exactly the same reason that the pictures in a film of real things do. Your persistence of vision erases

the spaces between them and makes them all run together into action. Like the frames in an ordinary film, each frame in an animated cartoon is a separate picture. Every single one of those pictures has to be drawn by hand.

The production of each animated movie begins with a story conference. A writer has had an idea, outlined it, and sketched the main characters. Then the writer, the director, the animators, and the producer get together to talk it over. The producer is responsible for seeing that all the details connected with making the cartoon work out smoothly together. He does not handle the budget of the picture as the other producer did.

The director sees that the picture flows into a smooth fast-moving whole. He works along on the story and decides the length and pattern of the scenes. But he can't tell the actors what to do.

The animators bring the story to life. They work out the characters and decide how they are going to act and what sort of personality they are going to have.

At the story conference, everyone pitches in with suggestions and ideas until they have the story pretty well worked out. The first treatment is a series of pictures of the hundred most important actions in the cartoon—the main actions that are going to tell the story. Along with these pictures go an explanation of the action and an indication of the dialogue.



THE ANIMATED CARTOON

Now the drawings take a back seat while the dialogue and sound effects for the whole picture are worked out in detail. Then the live actors who are to be the voices of the cartoon characters are called in, and the sound for the picture is recorded. The drawings in the picture must be matched to that sound.

The script for a cartoon is made by measuring the sound track exactly, measuring every word and syllable for length, every sound effect and beat of the music.

For instance, there on the sound track is the word "ouch!" and it stretches for 15 frames. In those 15 frames the animators must draw the character who is saying "ouch!" They must make his mouth form the word and make him jump or fall or do whatever he's doing while he's saying it.



PRODUCTION	TITLE	SHEET
B-29	THE BEAR AND THE RABBIT	(4)
ACTION		
EXP	CAMERA	4 3 2 1 EXP SOUND EFFECTS ACTION
		7 1/2
		8 2
		9 3
		10 4
		11 5
		12 6
		13 7
		14 8
		15 9
		16 10
		1 11
		2 12
		3 13
		4 14
		5 15
		6 16
		7 1
		8 2
		9 3

THE ANIMATED CARTOON

If the characters are dancing, they must be drawn to kick or whirl or bow exactly in time to the music. Since the characters are made to order, it's much easier to fit them to the sound than it is to match the sound to them.

Now, using this measured script, the first pencil drawings are animated.

If you put your finger to your chin, your hand and arm will take a great number of different positions before they get there. To animate a drawing, enough of these positions must be drawn separately to give the feeling of motion when they are projected one after another. Even the movie camera does not catch them all.

Often, when actions are very complicated, movies are made first of real people doing them. Then the animators study the film, frame by frame, to see the position of the action in each one. After the main actions have been animated, they are photographed to make sure that the action is clear and smooth. If it is jerky in spots, drawings will have to be added to fill it in. The projection room where the tryout film is shown is sometimes called the "sweat box." The producer, the director, and the animators stay in the sweat box until they have figured out ways to work out all the bugs or bad spots.

When these first drawings, which are called "pencils," have been corrected, they are passed on to assistants who clean out all the stray

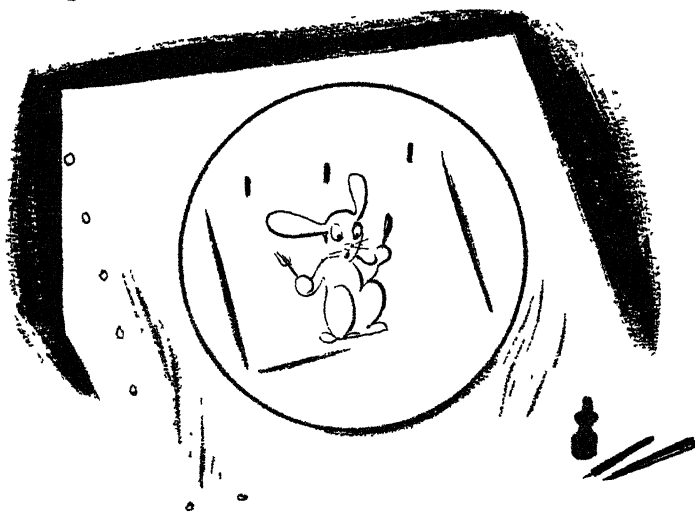


**GERTIE THE DINOSAUR
WAS THE FIRST
CARTOON CHARACTER**

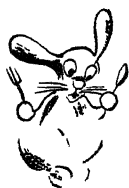
THE ANIMATED CARTOON

lines and trace them onto 8-by-10-inch sheets of white paper exactly like notebook paper with three holes for the rings: two long ones and a smaller, round one in the center. These holes fit over the pegs of an animation board.

An animation board is a tilted desk with a pane of glass in the center and a light under the pane of glass. The whole center of the board is circular so it can be turned and worked on from different angles. Right above the glass are three pegs over which the drawings are slipped so that they cover the glass part of the board. When a fresh sheet of paper is put on top of the drawing, the pegs hold the two sheets exactly in place, and the light makes the underneath one show through clearly. Using the bottom picture as a guide, the artist draws the slightly different next stage of the action.



First the main movements are filled in. Then assistants, called "in-betweeners," fill in the ones that are missing. Every artist has a guide sheet or a model for each of the characters, which shows the exact proportions of the character, his size in proportion to the other main characters, and how he looks from every direction.



By this time the complete action of the picture has been worked out in drawings, each one numbered, on notebook paper. And now all these drawings must be traced onto sheets of transparent plastic of the same size. These are called *cells*, and each cell will be one frame of the picture.

The cells are sent to the "inkers," who carefully trace the outlines of the drawings in ink. From there they are passed on to artists, called "painters," who paint in the color on the opposite side of the cell from the inked outline. The artists working on cells usually wear gloves so they won't leave fingerprints.

Once the drawings are opaqued, you can't see through them to any cell that may be placed underneath. This is important because each frame in a finished cartoon is usually a combination of a number of separate cells, placed one on top of another. Each character, and anything else in the picture that moves, is animated on a cell of its own.

For instance, if a bear and a rabbit were running through a shower of rain, the bear

THE ANIMATED CARTOON

would be on one series of cells, the rabbit on a second, and the falling raindrops on a third.



Now suppose the rabbit ran behind the bear. If the bear were transparent, as he would be in a frame of ordinary film, it would look like a double exposure. You would see the rabbit right through him. But since in a cartoon cell the painted bear is opaque, you can't see through him, and so the rabbit looks as if he really is passing behind the bear.

A chart tells each artist the number of the color to use on every part of the picture, and he follows the numbers carefully, taking that color from a jar of paint numbered to match. In this way, the colors on clothes or faces do not change throughout the picture.

Meanwhile the backgrounds are being made separately, either on cells the same size as the action cells or on longer ones called "pan papers." Making the backgrounds separately saves a lot of time and work. Instead of having to draw the whole background into every frame the way it is in a regular movie, one background cell can be used behind hundreds



THE ANIMATED CARTOON

of action drawings. Of course the animators and in-betweeners have to have charts of exactly where each piece of furniture, door, and window is placed in case one of the characters has to walk through a door or lean on a table.

Now the picture is ready for shooting. The camera is huge. The lens is built to look straight down at the pictures.

The pictures are placed on a square, glass-topped camera table, which may have separate layers for picture and cells. Sometimes when the cartoons look three-dimensional they have been taken with the action and backgrounds on different levels.

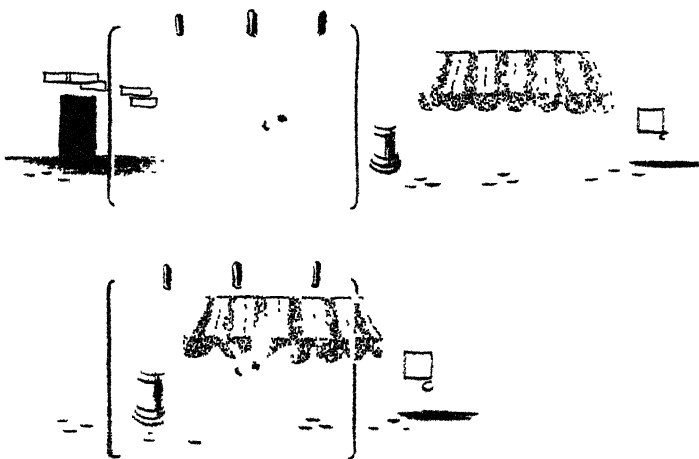
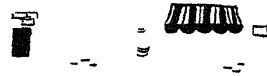
It takes two men to shoot the picture. One puts on the background cell, slipping it over the pegs on the camera table. Then he puts the action cell over it, slipping that over the pegs, too. The pegs keep the cells in register—exactly one above the other—and a glass frame clamps down to keep them flat. The other member of the camera crew is the cameraman who adjusts the camera and makes the exposure. He moves the camera down toward the table for close-ups and up for long shots. He takes the whole picture one frame at a time. After the cameraman has taken each frame, the other man removes that cell and puts on the one with the next number. They work with a script that tells them exactly what each frame is to be, the position of the camera during that frame, and when

THE ANIMATED CARTOON

to change or adjust the background cell.

Since the camera can't move from side to side or, in animation terms, from east to west, to take pan shots, without shooting outside the area of the camera table, the background itself is moved, and that's where the long background cells come in. They are moved from peg to peg along the bars of the camera table, and at each peg a new frame is exposed. The effect is exactly the same as it would be if the camera itself were moved.

The same trick is used when a character is supposed to be walking or running down a street, for instance. The action cells follow one another, but they stay on the same pegs. Meanwhile, the background is being moved, peg by peg, behind the figure. He looks as if he were passing the shops and houses while really they are passing him.

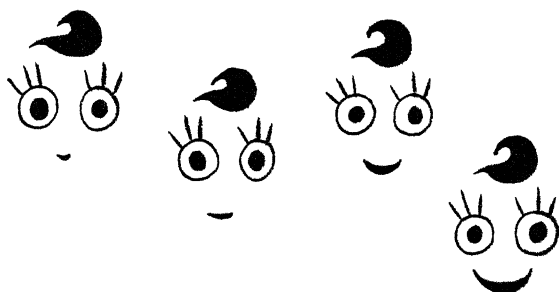


THE ANIMATED CARTOON

After the whole picture has been taken, the cells are washed off and used over again for practice work.

Sometimes you see an animated picture that isn't exactly a cartoon, because the characters are dolls instead of drawn figures. These pictures are made frame by frame, too. After each frame is exposed, the doll is moved a fraction of an inch and the next frame taken. Not only is the doll moved but also its head is changed for changes of expression. For instance, if a doll grins, each frame is shot with another head, each with a little more grin. If a character were to smile a big, slow grin, it might take as many as thirty-two heads.

Some animated pictures have passed far beyond the stage where they can be called cartoons. They are a real art of a very special kind.





Reel Fourteen

HOW YOU GET
THE MOVIES

FROM the moment a movie begins, everybody is working to get it into your theater. For all except educational pictures, the producers and the motion-picture companies have just one happy ending in mind. That is the day when you will step up to the box office and pay your money to see the picture.

To make sure that this will happen, the first thing the movie companies keep in mind is the censors. They know perfectly well that if the censors do not pass a picture millions of people will stay away from it, and so they start out by trying to please the censors.

A number of the movie companies operate their own board of censors. They voluntarily obey the rules of this board, which is called the Motion Picture Producers and Distributors of America. You probably hear of it more often as the "Will Hays office." The Hays

office has certain rules about what can and what cannot be shown in a movie. Although nobody *makes* the movie companies obey these rules, they know that it is good business to obey.

Long before the shooting starts, the script of a picture is sent to the Hays office to be okayed. If there are scenes in the script which the Hays office will not pass, it saves time and trouble to take them out or change them right away. After the picture is finished, it is reviewed by the association and, if it is okayed, it gets the stamp of approval. You can see that stamp down at the bottom of the screen credits.



Recently, though, some of the big studios have resigned from the Hays group to form a new one—the Society of Independent Motion Picture Producers. But in the SIMPP they voluntarily obey the same general rules that the Hays office group do. And they use the Hays seal.

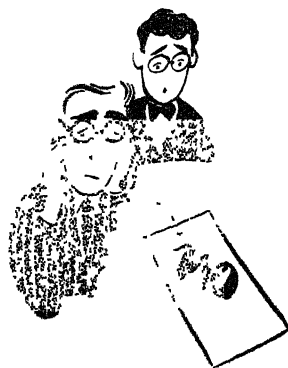
After a movie has passed an industry censorship board, it still has to pass local censorship boards all over the country, and the producers keep that in mind, too. These local boards have more real power than the Hays office because they can actually forbid the showing of a picture in their districts. Usually, though, they will settle for just having the part to which they object cut out in all showings through-

out their districts. The movie companies try to keep the more powerful censorship boards in mind when they are making their pictures. The banning of a movie by one of these powerful boards can mean the difference between financial success and failure for that picture. Sometimes, though, it's hard to please everybody, especially since censors in different parts of the country object to different things. One state does not like politicians to be corrupt. Another does not approve of thumbing noses.

In peacetime, when there is a large foreign market for American films, the movie companies try to keep their pictures free of things that would make the censors in other countries ban them. They try to stay away from political ideas. They make any citizens of those countries, who are characterized in the movies, friendly and likable instead of villainous or ridiculous. Villains are usually American.

The studios themselves carry out another kind of voluntary censorship for purely commercial reasons. They do not produce pictures backing ideas that they feel are not popular with a majority of Americans. They do not risk their investment fighting for causes until they are sure that their audiences are for those causes. They leave crusading to the documentary films.

All during the time a picture is being made,



HOW YOU GET THE MOVIES

the studio publicity department tries to keep it in the news because the more you hear about it, the more eager you are to see it. The studio publicity departments get a great deal of help from newspapers and magazines all over the country. They print more news from Hollywood than from any other place in the United States except Washington and New York. There are newspaper correspondents in Hollywood from all over the world, even from the Vatican.



After a picture has been finished and several hundred prints of it have been made, they are stored in the studio or laboratory vaults until it is time for them to be distributed. Sometimes they wait there for a year. During this time a distribution agency is booking the picture for showing in the theaters.

The distribution agencies are the bridge between the studios and the theaters. Some of the agencies are independent and others are owned by the studios themselves, but they all have the same job.

The distribution agencies rent films to the theaters. Pictures used to be rented in blocks of thirty or more—this was called “block booking”—but now, with few exceptions, films are rented singly or in blocks of no more than five. Under the old system, theater managers had to take a number of pictures they didn’t want in order to get the ones they did. The new way of renting films is the result of

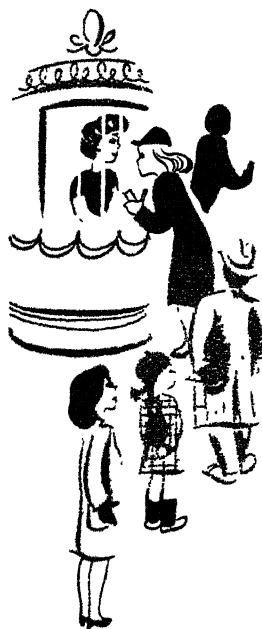
HOW YOU GET THE MOVIES

an agreement between the government and the major producing and distributing companies. Another result of this decree is that the theater manager must have an opportunity to see the films before he rents them instead of buying them "blind" as he did before.

The motion-picture companies try to lend a hand to the theater managers to ensure successful runs of their pictures at local theaters. One way they have of doing this is by making pressbooks available to the managers. A pressbook is a sort of newspaper about a picture, made up by the studio. It contains advance stories about the picture, news and feature stories about the stars for local newspapers, and sample advertisements and pictures that the manager can use to advertise the movie in his neighborhood.

The rental price a theater pays for a picture depends on the "run." If it is the first theater to show that picture anywhere in the vicinity, the price is very high. This price is usually a percentage of the box-office receipts, and it may be as high as 50 per cent. If the picture is being shown on a "road show" basis—which means that the admission price is \$1.10 or more—the percentage is even higher.

While it is at the first-run theater, nobody else for miles around can show the picture except for a very special arrangement where two theaters are run by the same management.



After the picture has left the first-run theater, it may move on to several second-run houses, and they pay the next highest price for it. So it goes all the way down the line. A picture may rent for thousands of dollars a week to one theater, and then a few months later for a very small fraction of that to another.

The distributor must see that his customers get the pictures they have ordered on time and in good condition, and that the pictures are picked up without delay and delivered at once to the next theaters on their schedule. Because there are only a few hundred prints of a picture made for the whole country, there isn't time for any one of them to lie idle. It must be in a truck or on a plane on its way to the next place with no delay.

It is the job of the theater manager to make people want to come to his theater to see the picture. He will try to book the stars and the type of pictures that he knows his customers like best. He plans the local advertisements for each picture. If he is a good manager, he will see that the seats are comfortable, that the air in the theater is good, that the screen is clean, and that all the equipment is in excellent shape.

A good projection man, in turn, will make sure that the light in the projector is strong enough and that the picture is in focus. He will see that the sound is kept at the right

volume so it won't be deafeningly loud or so low that you can't hear it when the lady behind you unwraps her candy. And if he notices any weak spots in the film, he'll mend them before they have a chance to break in the middle of the next show. He'll notice, too, when the reel is about to end and be ready to switch on the following reel in the next projector without a break. A reel generally runs for about twenty minutes. Most new projectors have an automatic signal that tells the projectionist to light up the next projector when the first reel is almost done.

In theaters that do not have these automatic change-over projectors, the projection man has another clue that the reel is almost finished. That clue is a tiny punch mark at the top of each frame. It appears on the screen as a small white dot, which you've probably never even noticed. When you suddenly see a blinding flash of light and the reel number on the screen, you'll know that the projectionist is asleep at the switch.

After the movies have been made and distributed, there is just one more step in getting them to you. That step is the projector, and it works like this.

The film unwinds from its reel and runs through wheels and a gate just as it does in the camera. The whole back of the projector encases a very brilliant carbon arc light, which is much stronger than any electric light.



HOW YOU GET THE MOVIES

The Film Unreels From Here

**A Brilliant Arc Light
Burns Here**

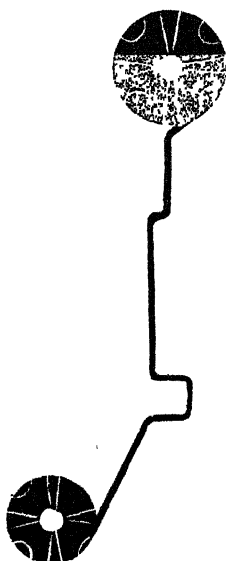
**The Film Passes
in Front of
the Light**

Lens

**And the Revolving
Shutter Lets Each
Frame Shine Through
to the Lens**

**The Film Continues
Down Between Another
Strong Light and
The Pe Cell, Which
Starts the Change
of the Picture on
the Sound Track
Back Into Sound**

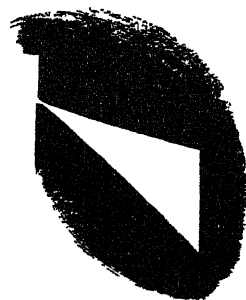
**The Film Reels
Onto Here**



The projector has a lens and a shutter just as the camera does. As each picture frame passes behind the lens, the shutter opens and allows the brilliant light to shine through it. During this time, the sound track is masked from the light. Where the picture is clear, a lot of light shines through. Where the picture is dark, very little light shines through. The lens magnifies this pattern of light and dark

HOW YOU GET THE MOVIES

and shoots it down to the screen in a big, fan-shaped beam that gets larger as it gets farther away from the projector. By the time it is stopped and reflected by the screen, the little picture passing behind the lens has been magnified 30,000 to 40,000 times.

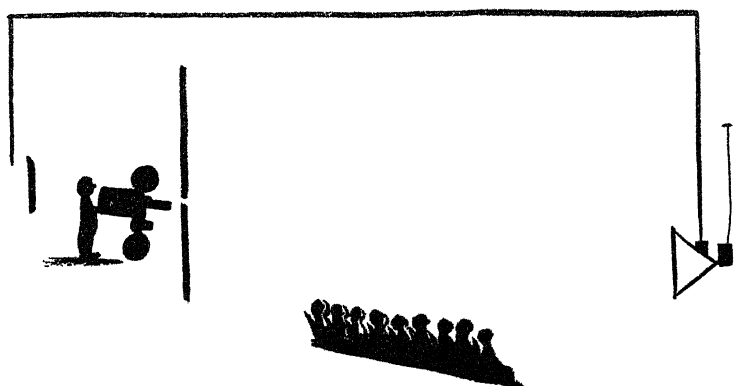


After the film passes behind the lens, it travels down through the projector until it comes to a place where another strong light, called the "exciter lamp," shines through the sound track. On the other side of the sound track is an electric eye. Do you remember, when the sound track was made, the sound was changed first to electricity, then to light, and finally to a picture of light? Well, now it is changed back.

As more or less light shines through the pattern on the sound track, the electric eye, which is called a PE cell, changes it into electricity. A strong current is produced when lots of light comes through and a weaker one when there is less light.

This current flows through amplifier tubes like the ones in the sound recorder. The amplifier magnifies this current until it is strong enough to vibrate the diaphragm of the loudspeaker. It is sent through wires to the loudspeaker behind the screen, and it comes out just the way it went into the microphone.

The reason the sound and the picture are not projected together is simple. The shutter opens and closes rapidly as each frame of the



picture is jerked past the aperture. But the sound track is printed, not in frames, but as a continuous strip, and it must flow uninterrupted past the PE cell. If it were projected with the picture, the sound would jerk off and on. The PE cell must be separated from the picture aperture by enough space and enough rollers to allow the jerky motion of the film past the aperture to smooth out and become a continuous motion.

On the positive print that is used in your theater, the sound is printed 19 frames ahead of the picture it matches so they come out together.

Now there you are, sitting back in your chair watching a picture. It has come a long way since the first story conference. It has come an even longer way since Mr. Muybridge's galloping horse. It's been a great show.



MOVIES
in your
CLASSROOM

TELEVISION
AT THE
MOVIES

MOVIES
over
TELEVISION

THREE-
DIMENSIONAL
MOVIES

ALSO SELECTED
SHORT
SUBJECTS •

GLOSSARY OF MOVIE TERMS

- ager*—The technician who makes costumes and furniture look old.
- angle, camera*—The position of the camera in taking the subject.
- angle shot*—A shot made after the master scene and with the camera in a different position.
- animation board*—The desk on which the drawings are made for animated cartoons.
- animator*—The artist who makes the successive drawings for animated cartoons.
- aperture*—The opening in the camera, projector, sound recorder, or positive printer at which each frame is stopped during exposure, projection, or printing.
- ash can*—Overhead multiple-arc light.
- baby spot*—The smallest spotlight, used for lighting small surfaces.
- backlight*—Light from the rear of the subject.
- baffle*—A portable wall placed around the set to absorb sound.
- baffle blankets*—The felt, muslin-covered sheets hung around the set to absorb sound.
- balloon tires*—Circles under the eyes in make-up.
- base*—The celluloid ribbon on which the photosensitive emulsion of movie film is placed.
- bath*—The chemical solutions used in processing film.
- billing*—The placing and size of the actors' and actresses' names in the list of the cast.
- bipack*—Color film with two color-sensitive emulsions.
- bit*—Small speaking part.
- blimp*—The soundproof metal cover placed over the camera to deaden its clicking.

GLOSSARY OF MOVIE TERMS

bloop—The noise made by a poorly patched splice in the sound track.

blooping patch—The triangular or oval black patch put over a splice in the positive sound track to eliminate the noise which that splice would make.

bonbon—A spotlight over 2,000 watts.

boom—A crane that carries the camera or microphone.

breakaway—A set or prop that is specially built to come apart easily.

broad—A rectangular floor lamp used for mass lighting.

business—Any bit of character acting.

camera—The mechanism that records pictures on light-sensitive film.

can—A metal film container or the mixer's earphone.

cast—The players in a movie.

catwalk—The overhead bridges and paths on the rigging.

cells—The frames in an animated cartoon.

change-over—The change from one projector to another.

chips—The carpenter.

cinematographer—The supervising cameraman.

cinematography—Motion-picture filming.

clappers—Two hinged pieces of wood that are banged together to help the editor synchronize action with the sound track.

claw—The mechanism in the camera or projector that pulls the film into place.

climax—The peak-action moment of the movie.

close-up—A scene in which the subject takes up almost the whole screen.

continuity—The carefully worked out written motion-picture script.

cooked—Overdeveloped.

- crepe hair*—False hair.
- "Cut"*—Director's signal that the shot is finished.
- cutter*—The editor who selects and arranges the scenes into a finished picture.
- cutting*—Selecting and arranging scenes into a picture.
- dailies*—All the developed scenes taken the day before.
- dead stage*—A stage on which no sound is being recorded.
- depth of focus*—After the camera is focused, the range or depth of field in which everything in the scene is sharp.
- deuce*—A 2,000-watt spotlight.
- developer*—The chemical that brings out the image on exposed film.
- developing*—Treating the film to bring out the image.
- diaphragm*—In the camera, the mechanism limiting the lens opening and thus controlling the amount of light that reaches the film. In the microphone or loud speaker, the vibrating disk that changes sound waves to electricity, or electricity back to sound waves.
- diffuser*—The glass or silk screen used to soften the light.
- director*—The coordinator and boss of a moving picture in the making.
- dissolve*—The merging of one scene into the following scene.
- documentary*—A film, other than a newsreel, that is a record of actual things.
- dolly*—A movable platform on which the camera or the microphone is mounted.
- dolly shot*—A shot made by the camera as it moves after the actors. This is sometimes called a follow shot.
- double exposure*—Two images, one on top of the other on the same film.

GLOSSARY OF MOVIE TERMS

"Down the chute"—Order to send sound to the amplifying room.

dress extras—Extras who own elaborate wardrobes.

dubbing—Re-recording the sound to include all sound effects for the finished film. Also putting any sound into the sound track.

dupe—A duplicate negative.

dynamite—The open connection box into which the studio lamps are plugged.

eagle—A perfect take.

ear—A square board of black canvas on the camera which keeps direct light from the lens.

editing—Cutting and rearranging the various shots into a complete film.

emulsion—The light-sensitive coating on the film base which finally produces the photographic image.

exchange—A distribution center for motion-picture prints.

exposure—Allowing light to act upon the photographic emulsion. The exposure varies with the amount of time the film is open to the light and the brightness of the light.

exposure meter—A device for measuring the amount of light reflected from the subject to be photographed and for figuring the proper exposure.

exterior—Any scene that looks as if it were taken outdoors.

fade-in—The gradual appearance of a scene from darkness.

fade-out—The gradual disappearance of a scene into darkness.

feature—A picture of five reels or more.

fill-in light—A light used to soften heavy shadows.

GLOSSARY OF MOVIE TERMS

film—An emulsion-coated strip of celluloid that will retain a photographic image.

film chamber—A removable section of the camera containing the film.

film gate—The movable metal piece that holds the film against the aperture.

filter—Colored glass or gelatin placed over the lens to accent or eliminate certain colors or shades.

finder—Eyepiece for seeing the area that appears in the lens.

five—A 5,000-watt spotlight.

fixing—Process of removing all undeveloped emulsion from the film.

flash—Very short scene.

flash back or cut back—A scene that interrupts the story to show something that has happened in the past.

flat—Painted canvas frame or thin board used in building sets.

floodlight—Bright lighting over a large area or the “inky” that makes it.

flop—A picture that doesn’t make money.

focus—To adjust the lens to make the image sharp.

footage—Length of film.

frame—A single picture on motion-picture film.

free lance—An actor not under contract to any one studio.

gaffer—The head electrician of a unit.

gag—Any comedy situation.

geared head—A tripod head with horizontal and vertical movements.

gobo—A black canvas over a three- by six-foot frame that is placed on the floor between the lights and the camera to keep direct light from the camera lens.

GLOSSARY OF MOVIE TERMS

goofie—A frightening weird shot in a horror or mystery film.

grip—An all-round handy man.

halation—A halo that appears around the photographic image if the shades do not keep direct light from the camera lens.

heavy—The villain.

hit—A successful movie.

"*Hit 'em!*"—Turn on the lights. "*Flash 'em*" and "*Kick 'em*" mean the same thing.

hypo—The solution that stops the action of the developer and dissolves the undeveloped parts of the emulsion.

inkies—Incandescent lights.

inky-dinky—An incandescent spot about the size of a grapefruit.

interior—Any indoor scene.

iris—The adjustable diaphragm in front of the camera lens which can be opened and closed to let in light.

iris in and iris out—Gradual appearance or fading of the scene through a widening or narrowing circle.

jenny—A portable electric generator.

juice—Electric current.

juicer—Electrician.

junior—Medium size concentrated spotlight, from 1,000 to 2,000 watts.

key light—The main light for lighting the actors' faces.

"*Kill 'em*"—Turn off the lights. "*Save 'em*" means the same.

lab—Place where films are developed and printed.

latent image—The image on the exposed film before it has been developed.

GLOSSARY OF MOVIE TERMS

- leader*—The blank film at the beginning of the developed film for threading through the projector.
- lens*—The curved-glass eye of the camera through which the scene comes to the film.
- lens hog*—An actor who tries to monopolize the center of the scene. He may be called a "lens lizard," too.
- level*—The volume of the sound.
- lines*—An actor's spoken part.
- live stage*—A stage on which sound is about to be recorded or on which the recording is taking place.
- location*—Any place away from the studio lot where movies are made.
- long shot*—A shot taking in the whole scene.
- lot*—The studio grounds.
- magazines*—The film containers of the camera.
- mask*—A cut-out frame placed behind the lens to limit the size or shape of the picture.
- master scene*—The first take of any scene shot as it appears in the script.
- medium shot*—A picture taken at a middle distance, between a long shot and a close-up.
- microphone or mike*—The instrument that changes sound waves into electrical waves.
- mike stew*—Unwanted sounds picked up by the microphone.
- mixer or monitor*—The sound-recording engineer.
- montage*—Quick cuts, dissolves, or wipes used in a rapid succession of pictures to give a number of impressions in a short time.
- motion picture*—a rapid series of pictures of the successive movements of an object.

GLOSSARY OF MOVIE TERMS

moviola—The peep-sight sound projector used by editors.

mug shot—A close-up.

negative—Film in which the light and dark tones of the photographed subject are reversed.

"*Off the line*"—Order to disconnect the recording machine motors.

operative cameraman—The cameraman who actually takes the pictures.

optical glass—The fine glass used to make lenses.

optical printer—A camera for making special effects.

orthochromatic film—A film that is sensitive to blue and green only.

O.S.—Script abbreviation for off stage.

pan—To swing the camera during a shot in order to include a wider view of the scene.

panchromatic film—A film sensitive to all the colors in the spectrum. It can change each color into shades from black to white.

parallel action—Alternate shots of two different actions happening at the same time.

peanut—The smallest inky.

perforations—The holes punched in the edge of the film, which fit over the mechanism sprockets in the camera and projector.

photoelectric cell—A device that changes light to electricity. Usually shortened to PE cell.

positive—The final print made from the negative, which is shown in your theater.

postscoring—Recording the sound after the picture has been taken.

powder man—Studio explosive expert.

GLOSSARY OF MOVIE TERMS

- prescoring*—Recording the sound before the picture is taken.
- press book*—Advance publicity and advertising matter on a picture sent to theater managers.
- preview*—Advance showing of a movie in a public theater.
- printer*—A machine for making the final positive prints from the negative.
- processing*—Developing and printing the film.
- prop*—Any movable article used in the set.
- prop man or props*—The man in charge of props.
- quickie*—A cheap, quickly made picture.
- raw film*—Unexposed, undeveloped film.
- recording channel*—The complete set of sound equipment, from the mike straight through to the film track.
- reel*—The spool on which the film is wound. The unit of motion-picture length, about 1,000 feet.
- reflector*—A surface used to reflect additional light onto the scene.
- release*—A finished movie.
- retake*—The rephotographing of an unsatisfactory scene.
- rifle*—A lamp with a corrugated or mirrored reflector.
- rigging*—The scaffolding that holds overhead lights.
- rushes*—Processed scenes of one picture taken the day before.
- scenario*—The written motion-picture script.
- scoop*—A hanging broad.
- score*—The music that accompanies the picture.
- screen*—The flat surface on which the picture is projected.
- scrim*—A gauze shade for softening light.
- script*—The accurately written scene-by-scene story of a movie. Also shooting script.

GLOSSARY OF MOVIE TERMS

script girl—A clerk who keeps an accurate, written record of everything pertaining to the actual shooting of the picture.

senior—A large condensing spotlight of about 5,000 watts.

sequence—A connected series of scenes.

setting—The interior or exterior where the action takes place.

sharpness—The clearness of the image.

shooting—Photographing any part of a movie.

shot—The simplest unit of a movie. Several shots make a scene and several scenes make a sequence.

shooting schedule—The written blueprint containing all directions for making the movie.

shutter—The mechanical device that interrupts the flow of light to the film.

silk—A frame with silk stretched across it for softening lights. Also called a butterfly.

sixty—A huge spotlight.

slapstick—Broad comedy.

slate—A board held up to the camera before each scene to identify the scene. On it is written the name of the picture, the director's name, the number of the scene and take, and the cameraman's name.

slow motion—The action slowed down by speeding the film through the camera.

sneak preview—Tryout preview.

sound track—The narrow band at the edge of the picture that carries the sound recorded on motion-picture film.

soup—Developing mixture.

spider—The fuse box and wires.

splice—To cement the ends of two strips of film together; also the joint that this makes.

- spotlight or spot*—A concentrated beam of light.
- still*—An ordinary photograph.
- stop*—The diaphragm opening in the camera.
- stunt man*—An actor who does the dangerous things in the picture.
- sync*—Short for synchronization which means that the sound and picture are running properly together.
- take*—The dialogue and picture recording of a scene.
- tank*—The large container in which films are developed.
- telescopic lens*—A lens that makes distant things look closer.
- tempo*—The timing and mood of a picture.
- test*—A picture tryout of an actor, a scene, or a costume.
- trailer*—A short film that advertises coming attractions.
- treatment*—The scene-by-scene breakdown of a story for motion-picture use. It is written before the shooting script is made.
- tripack*—A film with three color-sensitive emulsions, one on top of another.
- trucking shot*—A shot made while the camera itself is being moved.
- tubby*—Sound with too many low tones.
- turkey*—A bad movie.
- twins*—A double-arc lamp.
- types*—Players who are classified as playing one particular kind of part.
- underscoring*—Putting musical background behind dialogue.
- up to speed*—The camera and sound recorder moving in synchronization.
- variable-area track*—A sound track on which the sound is recorded in varying black peaks.

- variable-density track*—A sound track on which the sound is recorded by variations in the density of the exposure.
- viewer*—A magnifying device for looking at strips of film during editing.
- wind gag*—A silk cloth covering the mike.
- wipe*—Windshield-wiper effect of removing one scene from the film and replacing it with another.
- work print*—A collection of scenes spliced together into a picture and used during editing and the preview. The final negative and positives are made from the finished, corrected work print.
- wow-wows*—Pulsing quality in projected sound, usually caused by faulty sound-projecting equipment.
- "Wrap it up"*—"That's all for today."
- zissy*—A hissing sound track.
- zoom*—Shot apparently made by a camera zooming up to the subject.

BIBLIOGRAPHY

- America at the Movies*, Margaret Farrand Thorp; Yale University Press.
- Behind the Cinema Screen*, Stuart Chesmore; Thomas Nelson & Sons.
- Behind the Screen*, Edited by Stephen Watts; Arthur Barker, Ltd.
- Censorship of the Theatre and Moving Pictures*, Lamar T. Berman; The H. W. Wilson Company.
- Color Cinematography*, Major Adrian Bernard Klein, MBE.A.R.P.S.; American Photographic Publishing Company.
- Documentary Film*, Paul Rotha; W. W. Norton & Company, Inc.
- Eastman Motion Picture Films*; Eastman Kodak Company.
- Filming for Amateurs*, Paul Burnford; Pitman Publishing Corporation.
- Hollywood, The Movie Colony, The Movie Makers*, Leo C. Rosten; Harcourt, Brace and Company.
- How They Make a Motion Picture*, Ray Hoadley; The Thomas Y. Crowell Company.
- How to Make Animated Cartoons*, Nat Falk; Foundation Press, Inc.
- Kodak Reference Handbook*; Eastman Kodak Company.
- Let's Go to the Movies*, William Clayton Pryor and Helen Sloman Pryor; Harcourt, Brace and Company.
- Motion Picture Laboratory Practice*; Eastman Kodak Company.
- Movie Workers*, Alice V. Keliher, editor; Harper & Brothers.
- Photography—Its Principles and Practises*, C. B. Neblette; D. Van Nostrand Company, Inc.

BIBLIOGRAPHY

- Pictorial History of the Movies*, Deems Taylor; Simon and Schuster, Inc.
- Recording Sound for Motion Pictures*, Edited by Lester Cowan for the Academy of Motion Picture Arts and Sciences; McGraw-Hill Book Company, Inc.
- Sound Motion Pictures—Recording and Reproducing*, James R. Cameron; Cameron Publishing Company.
- Talking Pictures*, Bernard Brown, B.Sc.; Sir Isaac Pitman & Sons, Ltd.
- Talking Pictures*, Barrett C. Kiesling; Johnson Publishing Company.
- "Theatre and Motion Pictures," The Encyclopaedia Britannica, Inc.
- The American Film*, Eric H. Rideout; Mitre Press.
- The Art of Walt Disney*, Robert D. Field; The Macmillan Company.
- The Cinema in Education*, D. Charles Ottley; George Routledge & Sons, Ltd.
- The Cinema Today*, D. A. Spencer and H. D. Waley; Oxford University Press.
- The Film Daily*, Twentieth Anniversary Edition.
- The Film Sense*, Sergei Eisenstein; Harcourt, Brace and Company.
- The Movies Come from America*, Gilbert Seldes; Charles Scribner's Sons.
- The Rise of the American Film*, Lewis Jacobs; Harcourt, Brace and Company.
- The Technique of Motion Picture Production*; Interscience Publishers, Inc.
- Also issues of *The American Cinematographer*, *The Complete Photographer*, *The Film Daily*, and *Distribution*.

INDEX

A

Acting, changed with sound, 93
 in documentaries, 140-141
 early, 92
 movie technicalities in, 99-101
 studying the part, 99

Actors, 90-101
 animals as, 93-94
 bit, 57-58
 children, 98
 daily routine of, 97
 doubles for, 95-96
 dress extras, 59-60
 early, 29, 91-93
 extras, 58-60
 feature, 57
 fight teams of, 96
 search for, 91
 stand-ins for, 95
 stunt men, 96-97

Amplifier, in projecting, 165
 in recording, 79

Angle, camera, 70, 72, 104, 169

Animated cartoon, 147-156
 animation board used in making,
 151
 animators for, 150
 backgrounds for, 153-156
 camera used in making, 154
 director of, 148
 dolls used in, 156
 as in-betweeners, 152
 inkers for, 152
 painters of, 152
 producer of, 148
 sound for, 149-150

Animated cartoon, story for, 148
 story conference for, 148
 treatment of, 148

Aperture, in camera, 105, 106
 definition of, 169
 in projector, 166

Art director, supervising, 44-45
 unit, 44-45

B

Baffle, definition of, 84, 169

Bernhardt, Sarah, 91-92

Birth of a Nation, The, 28

"The Black Maria," 21-22

Blimp, 106-107

Boners, 13, 14, 72

Budget, 35, 39

C

Call sheet, 68-69, 98

Camera, 102-118
 animated cartoon, 154
 automatic, 137
 definition of, 170
 early, 23
 follow-focus, 107
 mechanics of, 105-106
 newsreel, 131
 stroboscopic, 143

Camera angles, 70, 72, 104

Camera aperture, 106

Camera boom, 107-108

Camera crew, 102

Camera dolly, 107

Camera focus, 99-100, 103

Camera lenses, 108

INDEX

- Camera lenses, definition of, 175
 - Camera tricks, 113-118
 - Cameramen, 15, 102-104
 - animated cartoon, 154-155
 - Army and Navy, 134-137
 - assistant, 70, 71, 103
 - newsreel, 131-133
 - operative, 103
 - Casting, 57-60
 - central, 58-59
 - studio department for, 57
 - Cells, 152-156
 - Censorship, 157-159
 - by foreign censors, 159
 - local boards, 158-159
 - Motion Picture Producers and Distributors of America, 157-158
 - in the script, 34
 - Society of Independent Motion Picture Producers, 158
 - Cinderella*, 25-26
 - Cinematographer, 102, 170
 - Cinephone, 76
 - Close-up, first, 27, 29
 - Color, in animated cartoons, 153
 - in costumes, 61
 - definition of, 109
 - of make-up, 62
 - Color camera, 109
 - script, 111-112
 - Continuity, 35
 - definition of, 170
 - Costumes, 60-61
 - care of, 60-61
 - color of, 61
 - materials for, 61
 - renting, 60
 - Cutting, 119-126
 - double cutting, 29, 123
 - early, 26
 - room, 120
 - rough cut, 121
 - Dailies, 118
 - De Forest, Lee, 78
 - Designers, 14
 - costume, 61
 - production, 45
 - set, 45
 - Diffusers, 54, 68
 - definition of, 170
 - Director, 12, 33, 69-70
 - for animated cartoon, 148
 - assistant, 16, 69
 - for documentary, 140-141
 - of photography, 15, 102-105
 - Distribution, 160-162
 - booking for, 160
 - rentals, 161-162
 - schedules for, 162
 - Documentary films, 138-142
 - crew for, 140
 - government production of, 141-142
 - producer of, 139-140
 - in war, 141-142
 - Dubbing, 86-89
 - definition of, 172
- D
-
- Eastman, George, 20
 - Edison, Thomas, 20-22, 76
 - Editing, 119-126
 - of documentary films, 141
 - early, 26
 - of home movies, 146
 - selection in, 119, 123
 - of work print, 126
 - Editor, 119-126
 - film, 16, 119-126
 - reports to, 103, 120
 - sound, 17, 121
 - story, 12, 32
 - Educational films, 142-145
- E

INDEX

Educational films, in war, 136-137

Electricians, 15, 47, 48

Exposure, 104-106

for close-ups, 62

definition of, 172

double, 25, 113-114

F

Film, action of light on, 106

chemical changes during processing
of, 126-127

direct color, 145

early, 20

latent image on, 174

processing of, 126-128

in Technicolor camera, 110

Film emulsion, 106

Film negative, 126-127, 128

definition of, 176

Film sizes, 144, 145

Flat, definition of, 173

in early sets, 43

in lighting, 54

Fleming valve, 78

Frame, in animated cartoon, 152

definition of, 25

magnification of, 165

size of, 16 mm., 144

35 mm., 144

G

Gaffer, 15, 66

Great Train Robbery, The, 27

Griffith, David Wark, 28-30, 91, 124

Grips, 15-16

H

Hays office, 157-158

Home movies, 145-146

J

Jenny, 48

Juicer, 15

K

Kinetograph, 21-22

Kinetoscope, 20-22

Koster and Bial's Music Hall, 22

L

Latham, Woodville, 22

Lauste, Eugene, 77-78

Levison, Wallace Gould, 20

Life of an American Fireman, The,
26-27

Lighting, 66-68

direction of, 104-105

in documentaries, 140

early, 29

on location, 54

number of lights on set, 66

power for, 48

rigging for, 48

types of, 67

Lighting effects, 68

Location, disadvantages on, 42-43

early, 42

permanent, 55

shooting on, 53-55

sound, 88-89

Location department, 36

Location manager, 36

Lot, the, 40

Lumières, the, 22

M

Make-up, 61-65

Meissonier, 18-19

Melies, George, 25-26, 113

Microphone, 79, 84

Mixer, 70, 84-85

Model, in set designing, 47

in special effects, 117-118

Montage, definition of, 124, 175

Motion pictures, budgets for, 35

definition of, 19, 175

INDEX

- Motion pictures, frames per second in, 19
 - length of, 30
 - trades and crafts used in, 37-38
- Moviola, 121-122
- Music, recording of, 86-87, 88
- Music director, 36
- Muybridge, 19

- N
- Newsreel, 129-133
 - early, 24, 130
 - human interest, 133
- Newsreel companies, 130-132
- Newsreel cost, 133
- Newsreel editing, 133
- Newsreel equipment, 131
- Newsreel stock shots, 133
- Newsreel unit, 131

- O
- Optical printer, 113-116

- P
- Pan shot, in animated cartoon, 155
 - first, 23
- Parallel action, 124
 - definition of, 176
- PE cell, 165
 - definition of, 176
- Peep show, 20-21
- Persistence of vision, 20
- Phonautograph, 75
- Phonograph, 76
- Porter, Edwin S., 26-27
- Preview, 125
- Print, making, 126-128
 - number distributed, 126
 - positive, 128
 - definition of, 176
 - work, 126
 - definition of, 180
- Process screen, 51-53, 117
- Processing, 126-128
 - of color film, 110-111
 - of combat film, 137
 - developing in, 126, 171
 - drying in, 128
 - fixing in, 127
 - printing in, 128
 - washing in, 126
- Producer, of animated cartoon, 148
 - assistant, 32
 - documentary, 139
 - executive, 11, 32
 - work of, 11, 32
- Production designer, 45
- Production manager, 16
- Projectionist, 162-163
- Projector, 162-166
 - exciter lamp, 165
 - PE cell, 165
- Prop man, 14, 49
- Propaganda films, 24, 141-142
- Property department, 35-36
 - dressing set, 49
- Publicity, 16, 160, 161
 - local theater, 162
 - pressbooks, 161

- Q
- Quickie, 37

- R
- Readers, 12
- Recording, 71, 79-82, 84-86
- Reis, Elias, 78-79
- Research, 13, 34, 45-46
- Rigging, 41, 48
- Rushes, 119-120

- S
- Scene, 29-30, 38
- Script, 33-35

INDEX

- Script, in animated cartoon, 149
 - in cutting, 120
 - copies of, 35-37
 - definition of, 177
 - shooting, 35
- Script girl, 16, 71-72, 178
- Sequence, 120-121
- Shipman Backing, 53
- Sets, 40-56
 - artists for, 15, 46, 47
 - builders of, 14-15, 47-48
 - effects in building, 49-51
 - interior of, early, 43
 - materials used in, 42-44
 - permanent, 40-42, 55
 - renderings of, 46
 - research for, 45-46
 - storing, 56
- Shooting, 70-74
 - schedule, 38-39, 68
 - definition of, 178
- Shot, 23
 - angle, 70, 72
 - definition of, 169
 - in cartoons, 154-155
 - master, 72
 - as part of scene, 29-30
- Shot transitions, 103-104
- Slate, 71, 103
 - definition of, 178
 - in editing, 121-122
- Slow motion, 116
 - definition of, 178
- Sound, 75-89
 - in cartoons, 149-150
 - dubbing in, 86-89
 - definition of, 172
 - early, 75-79
 - editing of, 83, 121
 - on location, 88-89
 - postscoring of, 176
 - Sound, prescoring of, 177
 - recording, system of, 79-82
 - re-recording of, 89, 122
 - single system of, 131-132
 - Sound console, 70, 84
 - Sound effects, 86-88
 - Sound men, 15
 - Sound mixer, 70, 84-85
 - Sound newsreel, 131-132
 - Sound projection, 165-166
 - Sound recording, 71, 79-82, 84-86
 - Sound recordist, 71, 85
 - Sound script, 85
 - Sound stage, 83-84
 - Sound tracks, 77, 81
 - definition of, 178
 - in editing, 122
 - number of, 88
 - on the print, 166
 - variable area in, 81-82
 - variable density in, 81-82
- Special effects, 17, 113-118
 - camera effects department, 113
 - dissolve, 113
 - definition of, 172
 - double exposures, 113-114
 - early, 25
 - fade, 113
 - definition of, 172
 - masks, 115-116
 - reticulation, 128
 - tank, 42
 - wind machine, 42
- Splice, definition of, 178
 - homemade, 146
 - in sound track, 83
- Story, for animated cartoon, 148
 - changes in, for movie, 33
 - purchase of, 32
- Studios, location of, 27
 - lot description of, 37, 40-42

INDEX

T

Technical advisers, 13
Technicolor, 109-112
 camera for, 109
 matrix for, 111
 print in, 111
 processing, 110-111
Tests, of actors, 58
 of costumes, 61
Theater manager, 162

Time lapse, 116, 144
Treatment, 12, 34-35
 in animated cartoon, 148
 definition of, 179
Tripod, 23, 107

W

Wardrobe, 15
 work of, '60-61
Writers, 12, 33-34

